

APPENDIX D
COST ESTIMATES

Note that pre-design sampling costs have been assumed to be included in remedial design costs, as appropriate.

APPENDIX D-1

SW ALTERNATIVE COST ESTIMATES

Appendix D-1a

Cost Estimates for Alternative SW-2

TABLE D-1a.1
Cost Estimate Summary for
Alternative SW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COSTS

Construction Activities

Implementation Plans/Submittals	\$10,000
Install Security Fence	
Contractor	\$10,000
Subtotal, Install Security Fence	<u>\$10,000</u>
Post-Construction Submittals/As-Built	\$5,000
Subtotal, Construction Activities	\$25,000
Scope Contingency (15% Construction Activities Subtotal)	\$3,800
Bid Contingency (15% Construction Activities Subtotal)	\$3,800
Subtotal, Construction Activities with Contingencies	<u><u>\$30,000</u></u>

Professional/Technical Services

Project Management (10% Construction Activities Subtotal w/Contingencies)	\$3,000
Remedial Design (20% Construction Activities Subtotal w/Contingencies)	\$6,000
Construction Management (15% Construction Activities Subtotal w/Contingencies)	\$4,500
Subtotal, Professional/Technical Services	<u><u>\$14,000</u></u>

Institutional Controls

Establish Deed Restrictions	\$50,000
Subtotal, Establish Deed Restrictions	<u><u>\$50,000</u></u>

TOTAL, CAPITAL COSTS

\$90,000

ANNUAL O&M COSTS

O&M Activities

Annual Maintenance/Repair Activities	
Contractor	\$3,015
Engineer	\$7,419
Subtotal, Annual Maintenance/Repair Activities	<u>\$10,434</u>
Groundwater and Surface Water Monitoring	
Engineer	
Preparation/Mobilization/Demobilization	\$8,600
Water Level Gauging Event	\$3,900
Sampling Event	\$46,000
Investigation-Derived Waste Disposal	\$2,000
Subtotal, Engineer	<u>\$60,000</u>
Laboratory	\$13,000
Contractor	\$9,600
Subtotal, Groundwater and Surface Water Monitoring	<u><u>\$83,000</u></u>
Subtotal, Annual O&M Activities	\$93,000
Scope Contingency (15% Annual O&M Activities Subtotal)	\$14,000
Bid Contingency (15% Annual O&M Activities Subtotal)	\$14,000
Subtotal, Annual O&M Activities with Contingencies	<u><u>\$120,000</u></u>

TABLE D-1a.1
Cost Estimate Summary for
Alternative SW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Professional/Technical Services	
Project Management (10% Annual O&M Activities Subtotal w/Contingencies)	\$12,000
Technical Support (15% Annual O&M Activities Subtotal w/Contingencies)	\$18,000
Subtotal, Professional/Technical Services	\$30,000
TOTAL, ANNUAL O&M COSTS	\$150,000
PERIODIC COSTS	
Construction/O&M	
Every 5 Years O&M Activities	
Periodic Maintenance/Repair Activities (every 5 years)	
Contractor	
Monitoring Well Decommissioning & Replacement	\$9,800
Maintain/Repair Security Fence	\$8,200
Update Elevation Survey	\$2,800
Subtotal, Contractor	\$21,000
Engineer	
Subtotal, Periodic Maintenance/Repair Activities (every 5 years)	\$9,900
	\$31,000
Subtotal, Every 5 Years O&M Activities	
Scope Contingency (15% of Every 5 Years O&M Activities Subtotal)	\$31,000
Bid Contingency (15% of Every 5 Years O&M Activities Subtotal)	\$4,700
Subtotal, Every 5 Year O&M Activities with Contingencies	\$40,000
Year 100 Construction/O&M Activities	
Decommissioning of Monitoring Network (year 100 only)	
Contractor	
	\$82,000
Engineer	
	\$68,000
Subtotal, Decommissioning of Monitoring Network (year 100 only)	\$150,000
Subtotal, Year 100 Construction/O&M Activities	
Scope Contingency (15% of Year 100 O&M Activities Subtotal)	\$150,000
Bid Contingency (15% of Year 100 O&M Activities Subtotal)	\$23,000
Subtotal, Year 100 Construction/O&M Activities with Contingencies	\$200,000
Subtotal, Periodic Construction/O&M Costs	\$240,000
Professional/Technical Services	
Project Management (10% of Periodic O&M Subtotal w/Contingencies)	\$24,000
Technical Support (15% of Periodic O&M Subtotal w/Contingencies)	\$36,000
Five-Year Review	\$13,000
Subtotal, Professional/Technical Services	\$73,000
TOTAL, PERIODIC COSTS	\$310,000

TABLE D-1a.1
Cost Estimate Summary for
Alternative SW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$90,000	\$90,000	1	\$90,000
Annual O&M Costs	1-100	\$15,000,000	\$150,000	14.3	\$2,140,000
Periodic Costs	5	\$63,000	\$63,000	0.713	\$45,000
Periodic Costs	10	\$63,000	\$63,000	0.508	\$32,000
Periodic Costs	15	\$63,000	\$63,000	0.362	\$22,800
Periodic Costs	20	\$63,000	\$63,000	0.258	\$16,300
Periodic Costs	25	\$63,000	\$63,000	0.184	\$11,600
Periodic Costs	30	\$63,000	\$63,000	0.131	\$8,300
Periodic Costs	35	\$63,000	\$63,000	0.0937	\$5,900
Periodic Costs	40	\$63,000	\$63,000	0.0668	\$4,200
Periodic Costs	45	\$63,000	\$63,000	0.0476	\$3,000
Periodic Costs	50	\$63,000	\$63,000	0.0339	\$2,140
Periodic Costs	55	\$63,000	\$63,000	0.0242	\$1,520
Periodic Costs	60	\$63,000	\$63,000	0.0173	\$1,090
Periodic Costs	65	\$63,000	\$63,000	0.0123	\$770
Periodic Costs	70	\$63,000	\$63,000	0.00877	\$550
Periodic Costs	75	\$63,000	\$63,000	0.00625	\$390
Periodic Costs	80	\$63,000	\$63,000	0.00446	\$280
Periodic Costs	85	\$63,000	\$63,000	0.00318	\$200
Periodic Costs	90	\$63,000	\$63,000	0.00227	\$143
Periodic Costs	95	\$63,000	\$63,000	0.00162	\$102
Periodic Costs	100	\$310,000	\$310,000	0.00115	\$357

TOTAL PRESENT VALUE OF ALTERNATIVE

\$2,400,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-1a.2
Detailed Cost Estimate for
Alternative SW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SW-2: Limited Action

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS					
Construction Activities					
Implementation Plans/Submittals	1	\$10,000	Ea.	\$10,000	SHA estimate
Install Security Fence					
<i>Contractor</i>					
Clearing, Medium Brush with Average Grub & Some Trees	0.5	\$1,254	Acre	\$627	ECHOS 17 01 0103; Assumes distance of 246 feet by 20 feet wide will be cleared at same level of effort as 0.5 acre.
Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	250	\$36	L.F.	\$9,000	Means 32 31 13.20 0500
Gate for 6' high fence, 1-5/8" frame, 3' wide, galv. steel	1	\$358	Ea.	\$358	Means 32 31 13.20 1400
Subtotal, Contractor				\$10,000	\$9,985
Subtotal, Install Security Fence				\$10,000	\$9,985
Post-Construction Submittals/As-Builts	1	\$5,000	Ea.	\$5,000	SHA estimate
Subtotal, Construction Activities				\$25,000	
<i>Scope Contingency (15% Construction Activities Subtotal)</i>				\$3,800	OSWER 5-6: Assume 15% of Construction Activities Subtotal
<i>Bid Contingency (15% Construction Activities Subtotal)</i>				\$3,800	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities with Contingencies				\$30,000	
Professional/Technical Services					
<i>Project Management (10% Construction Activities Subtotal w/Contingencies)</i>				\$3,000	OSWER 5-8: Assume 10% of Construction Activities Subtotal including contingencies
<i>Remedial Design (20% Construction Activities Subtotal w/Contingencies)</i>				\$6,000	OSWER 5-8: Assume 20% of Construction Activities Subtotal including contingencies
<i>Construction Management (15% Construction Activities Subtotal w/Contingencies)</i>				\$4,500	OSWER 5-8: Assume 15% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$14,000	
Institutional Controls					
Establish Deed Restrictions					
<i>Engineer</i>					
Establish Institutional Controls in the form of Deed Restrictions	10	\$5,000	Ea.	\$50,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				\$50,000	\$50,000
Subtotal, Establish Deed Restrictions				\$50,000	\$50,000
Subtotal, Institutional Controls				\$50,000	
TOTAL, CAPITAL COSTS				\$90,000	

TABLE D-1a.2
Detailed Cost Estimate for
Alternative SW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SW-2: Limited Action

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
ANNUAL O&M COSTS					
O&M Activities					
Annual Maintenance/Repair Activities					
<i>Contractor</i>					
Clearing, Medium Brush with Average Grub & Some Trees	1	\$1,254	Acre	\$1,254	ECHOS 17 01 0103; Assumes access paths to/from and areas around monitoring points will be cleared at same level of effort as one acre.
Equipment Mobilization	1	\$260	L.S.	\$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	1	\$1,275	Day	\$1,275	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" Expansion Plug	2	\$20	Ea.	\$40	Environmetal Drilling (EDI) Invoice dated 11/06/03
80# Concrete Mix	2	\$18	Ea.	\$36	Environmetal Drilling (EDI) Invoice dated 11/06/03
8" Manhole, water-tight, traffic-rated	2	\$75	Ea.	\$150	Environmetal Drilling (EDI) Invoice dated 11/06/03
Subtotal, Contractor				\$3,015	
<i>Engineer</i>					
Labor, Quarterly Inspections	4	\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate of \$99/hr. See Note 3.
Misc. Field Expenses (e.g. mileage, personal protecti	1	\$594	L.S.	\$594	Assume 15% of field labor cost.
Labor, Annual Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$137	L.S.	\$137	Assume 5% of report preparation labor cost.
Subtotal, Engineer				\$7,419	
Subtotal, Annual Maintenance/Repair Activities				\$10,434	

Groundwater and Surface Water Monitoring

<i>Engineer</i>					
Preparation/Mobilization/Demobilization					
Labor	52	\$99	Hr.	\$5,148	SHA estimate, unit cost based on 2006 Site monitoring event
Truck rental	12	\$70	Day	\$840	Assumes Penskee 16' box truck rental.
Portable Storage Unit Rental	1	\$165	Month	\$165	SHA estimate, based on experience.
Portable Eyewash Station	1.5	\$175	Week	\$263	SHA estimate, based on experience.
55-gallon steel drums	4	\$55	Ea.	\$220	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
55-gallon poly drums	2	\$60	Ea.	\$120	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Drum delivery	2	\$225	Ea.	\$450	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Dumpster rental	1	\$650	Ea.	\$650	SHA estimate; Assumes 15 CY dumpster rental for two weeks and a disposal weight of one ton.
Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	1	\$773	L.S.	\$773	Assume 15% of labor cost
Subtotal, Preparation/Mobilization/Demobilization				\$8,600	\$8,629
Water Level Gauging Event					
Labor	34	\$99	Ea.	\$3,366	Based on 2006 Sampling Round Costs.
Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	1	\$505	L.S.	\$505	Assume 15% of labor cost
Subtotal, Water Level Gauging Event				\$3,900	\$3,871

TABLE D-1a.2
Detailed Cost Estimate for
Alternative SW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SW-2: Limited Action

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Sampling Event					
Labor	25	\$1,300	Location	\$32,500	SHA estimate, unit cost based on 2006 Site monitoring event
Bladder Pump	4.5	\$160	Wk.	\$720	SHA estimate, based on experience.
Bladder Pump Expendables	20	\$45	Ea.	\$900	HAS estimate; Includes teflon bladder, check balls, o-rings and grab plates.
YSI Low Flow Multi Meter	4.5	\$325	Wk.	\$1,463	SHA estimate, Assumes YSI 556 unit.
Controller	4.5	\$245	Wk.	\$1,103	SHA estimate, based on experience.
Compressor	4.5	\$85	Wk.	\$383	SHA estimate, based on experience.
Water Level Meter	4.5	\$100	Wk.	\$450	SHA estimate; Assumes MP30 Drawdown Meter
Turbidity Meter	4.5	\$90	Wk.	\$405	SHA estimate; Assumes HACH 2100P unit.
Battery	6.5	\$25	Wk.	\$163	SHA estimate, based on experience.
Photoionization Deetector	4.5	\$390	Wk.	\$1,755	SHA estimate, based on experience.
Tubing, Bonded 1/8 x 1/4 LDPE to 1/8 x 1/4 teflon li	1000	\$1.00	Ft.	\$1,000	SHA estimate, based on experience.
Tubing, 0.17 X 1/4 Teflon lined	20	\$0.15	Ft.	\$3	SHA estimate, based on experience.
Tubing, 1/16 X 1/8 LDPE	20	\$1.45	Ft.	\$29	SHA estimate, based on experience.
Lap Top Computer	1.5	\$90	Wk.	\$135	SHA estimate, based on experience.
Misc. Expenses (e.g. mileage, telephone, reproduction, postage, personal protective equipment, etc.)	1	\$4,875	L.S.	\$4,875	Assumes 15% of labor cost.
Subtotal, Sampling Event				\$46,000	\$45,882
Investigation-Derived Waste Disposal					
55-gallon Non-Regulated rinse water	4	\$215	Ea.	\$860	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
55-gallon high pH water	1	\$260	Ea.	\$260	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
55-gallon Methanol & water	1	\$230	Ea.	\$230	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Pick-up Fee; (manifests, fuel, insurance)	2	\$300	Ea.	\$600	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Subtotal, Investigation-Derived Waste Disposal				\$2,000	\$1,950
Subtotal, Engineer				\$60,000	\$60,332
Laboratory					
Chemical analysis, VOC by 8260B	35	\$110	Ea.	\$3,850	Alpha Woods Hole Labs 2006/2007 lab fees; See Note 4.
Chemical analysis, SVOC by 8270	35	\$155	Ea.	\$5,425	Alpha Woods Hole Labs 2006/2007 lab fees; See Note 4.
Chemical analysis, Metals	266	\$13	Ea.	\$3,458	Alpha Woods Hole Labs 2006/2007 lab fees; See Note 4.
Courier	7	\$75	Day	\$525	Alpha Woods Hole Labs 2006/2007 lab fees.
Misc. (Lab disposal fees)	1	\$127	L.S.	\$127	Assume 1 percent of total lab fees.
Subtotal, Laboratory				\$13,000	\$13,385
Contractor					
Data Validation	33	\$290	Location	\$9,570	New Environmental Horizons, Inc. costs from 2006; Unit cost based on number of sampling locations.
Subtotal, Contractor				\$9,600	\$9,570
Subtotal, Groundwater and Surface Water Monitoring				\$83,000	\$83,287
Subtotal, Annual O&M Activities				\$93,000	
Scope Contingency (15% Annual O&M Activities Subtotal)				\$14,000	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
Bid Contingency (15% Annual O&M Activities Subtotal)				\$14,000	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
Subtotal, Annual O&M Activities with Contingencies				\$120,000	

TABLE D-1a.2
Detailed Cost Estimate for
Alternative SW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SW-2: Limited Action

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
<i>Project Management (10% Annual O&M Activities Subtotal w/Contingencies)</i>				\$12,000	OSWER 5-8: Assume 10% of Annual O&M Subtotal including contingencies
<i>Technical Support (15% Annual O&M Activities Subtotal w/Contingencies)</i>				\$18,000	OSWER 5-8: Assume 15% of Annual O&M Subtotal including contingencies
Subtotal, Professional/Technical Services				\$30,000	
TOTAL, ANNUAL O&M COSTS				\$150,000	

PERIODIC COSTS

Construction/O&M

Every 5 Years O&M Activities

Periodic Maintenance/Repair Activities (every 5 years)

Contractor

Monitoring Well Decommissioning & Replacement

Equipment Mobilization	1	\$260	L.S.	\$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	5	\$1,275	Day	\$6,375	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" PVC Well Screen	20	\$5.50	L.F.	\$110	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" PVC Well Riser	80	\$4.00	L.F.	\$320	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" PVC End Point	2	\$7.25	Ea.	\$15	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" Expansion Plug	2	\$20	Ea.	\$40	Environmetal Drilling (EDI) Invoice dated 11/06/03
Filter Pack, silica sand	80	\$1.10	L.F.	\$88	Environmetal Drilling (EDI) Invoice dated 11/06/03
Bentonite	4	\$32	L.F.	\$128	Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Grouting	180	\$5	L.F.	\$900	Environmetal Drilling (EDI) Invoice dated 11/06/03
80# Concrete Mix	6	\$18	Ea.	\$108	Environmetal Drilling (EDI) Invoice dated 11/06/03
8" Manhole, water-tight, traffic-rated	6	\$75	Ea.	\$450	Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Roller Bit Wear, per foot	30	\$25	L.F.	\$750	Environmetal Drilling (EDI) Invoice dated 11/06/03
Drum, 55-gallon steel	1	\$55	Ea.	\$55	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Drum Transportation & Disposal, Non-Regulated So	1	\$180	Ea.	\$180	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Subtotal, Monitoring Well Replacement				\$9,800	\$9,779

Maintain/Repair Security Fence

Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	228	\$36	L.F.	\$8,208	Means 32 31 13.20 0500; Assumes 10% of security fence is repaired every 5 years.
Subtotal, Maintain/Repair Security Fence				\$8,200	\$8,208

Update Elevation Survey

Surveying, 2-person Crew	1	\$2,023	Day	\$2,023	ECHOS 99 04 1201
Subtotal, Update Elevation Survey				\$2,800	\$2,773
Subtotal, Contractor				\$21,000	\$20,759

Engineer

Labor, Oversight	55	\$99	Ea.	\$5,445	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$817	L.S.	\$817	Assumes 15% of oversight labor cost.
Labor, Summary Report Preparation	28	\$124	Hr.	\$3,472	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$174	L.S.	\$174	Assumes 5% of report preparation labor cost.
Subtotal, Engineer				\$9,900	\$9,908

Subtotal, Periodic Maintenance/Repair Activities (every 5 years) \$31,000 \$30,667

TABLE D-1a.2
Detailed Cost Estimate for
Alternative SW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SW-2: Limited Action

DESCRIPTION	UNIT			COST	COMMENTS/REFERENCE
	QTY	COSTS	UNITS		
	Subtotal, Every 5 Years O&M Activities			\$31,000	
<i>Scope Contingency (15% of Every 5 Years O&M Activities Subtotal)</i>				\$4,700	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
<i>Bid Contingency (15% of Every 5 Years O&M Activities Subtotal)</i>				\$4,700	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Subtotal, Every 5 Year O&M Activities with Contingencies				\$40,000	
Year 100 Construction/O&M Activities					
Decommissioning of Monitoring Network (year 100 only)					
Contractor					
Equipment Mobilization	1	\$260	L.S.	\$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	54	\$1,275	Day	\$68,850	Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Grouting	2,700	\$5	L.F.	\$13,500	Environmetal Drilling (EDI) Invoice dated 11/06/03
Subtotal, Contractor				\$82,000	\$82,350
Engineer					
Labor, Oversight	594	\$99	Hr.	\$58,806	See Note 3.
Misc. Expenses (e.g. mileage, telephone, reproduction, postage, personal protective equipment, etc.)	1	\$8,821	L.S.	\$8,821	Assume 15% of labor cost
Subtotal, Engineer				\$68,000	\$67,627
Subtotal, Decommissioning of Monitoring Network (year 100 only)				\$150,000	\$149,977
Subtotal, Year 100 Construction/O&M Activities				\$150,000	
<i>Scope Contingency (15% of Year 100 O&M Activities Subtotal)</i>				\$23,000	OSWER 5-6: Assume 15% of Year 100 O&M Activities Subtotal
<i>Bid Contingency (15% of Year 100 O&M Activities Subtotal)</i>				\$23,000	OSWER 5-6: Assume 15% of Year 100 O&M Activities Subtotal
Subtotal, Year 100 Construction/O&M Activities with Contingencies				\$200,000	
Subtotal, Periodic Construction/O&M Costs				\$240,000	

TABLE D-1a.2
Detailed Cost Estimate for
Alternative SW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SW-2: Limited Action

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
<i>Project Management (10% of Periodic O&M Subtotal w/Contingencies)</i>				\$24,000	OSWER 5-8: Assume 10% of Periodic O&M Subtotal including contingencies
<i>Technical Support (15% of Periodic O&M Subtotal w/Contingencies)</i>				\$36,000	OSWER 5-8: Assume 15% of Periodic O&M Subtotal including contingencies
Five-Year Review					
<i>Engineer</i>					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
Subtotal, Engineer				\$13,000	<i>\$13,020</i>
Subtotal, Five-Year Review				\$13,000	<i>\$13,020</i>
Subtotal, Professional/Technical Services				\$73,000	
TOTAL, PERIODIC COSTS				\$310,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sum S.F. = square feet
C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- "OSWER" refers exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," July 2000.
- All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

Appendix D-1b

Cost Estimates for Alternative SW-3

Note that this appendix includes costs from the Draft FS (SHA, 2007) for the alternative previously designated as SW-4. Only edits to the titles/headers were made for this version of the FS.

TABLE D-1b.1
Cost Estimate Summary for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COSTS

Construction Activities

Implementation Plans/Submittals	\$86,000
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Installation of Groundwater Treatment System

Contractor

Treatment System Equipment Installation	\$210,000
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Instrumentation	\$54,000
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Electrical	\$180,000
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Water Supply	\$16,000
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Treatment Building	\$120,000
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Subtotal, Contractor	\$570,000
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Engineer	\$100,000
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Subtotal, Installation of Groundwater Treatment System	\$670,000
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Install Groundwater Extraction Trench, Underground System Piping, & Surface Water Discharge Outfall

Contractor

Mobilization/Demobilization	\$4,300
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Extraction Trench Excavation & Dewatering	\$36,000
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Extraction Trench Construction & Backfill	\$45,000
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Underground Piping Excavation	\$21,000
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Underground Piping Placement & Backfill	\$3,100
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Surface Water Discharge Outfall	\$10,000
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Soil Stabilization	\$9,243
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Transportation/Disposal	\$37,000
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Site Restoration	\$79
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Subtotal, Contractor	\$170,000
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Engineer	\$25,000
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Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall	\$190,000
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Post-Construction Submittals/As-Builts	\$43,000
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Subtotal, Construction Activities	\$990,000
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Scope Contingency (15% of Construction Activities Subtotal)	\$150,000
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Bid Contingency (15% of Construction Activities Subtotal)	\$150,000
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Subtotal, Construction Activities with Contingencies	\$1,300,000
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Professional/Technical Services

Project Management (6% of Construction Activities Subtotal w/Contingencies)	\$78,000
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Remedial Design (12% of Construction Activities Subtotal w/Contingencies)	\$160,000
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Construction Management (8% of Construction Activities Subtotal w/Contingencies)	\$100,000
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Subtotal, Professional/Technical Services	\$340,000
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TABLE D-1b.1
Cost Estimate Summary for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Institutional Controls	
Establish Deed Restrictions	\$50,000
Subtotal, Institutional Controls	<u><u>\$50,000</u></u>
 TOTAL, CAPITAL COSTS	 <u><u><u>\$1,700,000</u></u></u>
 ANNUAL O&M COSTS	
O&M Activities	
Groundwater Treatment System O&M	
Contractor	\$89,000
Utilities	\$5,000
Engineer	\$16,000
Laboratory	\$21,000
Subtotal, Groundwater Treatment System O&M	<u><u>\$130,000</u></u>
Annual Maintenance/Repair Activities	
Contractor	\$3,000
Engineer	\$1,100
Subtotal, Annual Maintenance/Repair Activities	<u><u>\$4,200</u></u>
Groundwater and Surface Water Monitoring	
Engineer	
Preparation/Mobilization/Demobilization	\$8,600
Water Level Gauging Event	\$3,900
Sampling Event	\$46,000
Investigation-Derived Waste Disposal	\$2,000
Subtotal, Engineer	<u><u>\$60,000</u></u>
Laboratory	\$13,000
Contractor	\$9,600
Subtotal, Groundwater and Surface Water Monitoring	<u><u>\$83,000</u></u>
Subtotal, Annual O&M Activities Costs	\$220,000
Scope Contingency (15% Annual O&M Activities Subtotal)	\$33,000
Bid Contingency (15% Annual O&M Activities Subtotal)	\$33,000
Subtotal, O&M Activities with Contingencies	<u><u><u>\$290,000</u></u></u>
Professional/Technical Services	
Project Management (10% Annual O&M Activities Subtotal w/Contingencies)	\$29,000
Technical Support (15% Annual O&M Activities Subtotal w/Contingencies)	\$44,000
Subtotal, Professional/Technical Services	<u><u><u>\$73,000</u></u></u>
 TOTAL, ANNUAL O&M COSTS	 <u><u><u>\$360,000</u></u></u>

TABLE D-1b.1
Cost Estimate Summary for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PERIODIC COSTS

Construction/O&M

Every 5 Years O&M Activities	
Periodic Maintenance/Repair Activities (every 5 years)	
Contractor	
Monitoring Well Decommissioning & Replacement	\$9,800
Update Elevation Survey	\$2,800
Subtotal, Contractor	\$13,000
Engineer	\$9,900
Subtotal, Periodic Maintenance/Repair Activities (every 5 years)	\$22,000
Subtotal, Every 5 Year O&M Activities	\$22,000
Scope Contingency (15% of Every 5 Years O&M Activities Subtotal)	\$3,300
Bid Contingency (15% of Every 5 Years O&M Activities Subtotal)	\$3,300
Subtotal, Every 5 Year O&M Activities with Contingencies	\$29,000
Year 100 Construction/O&M Activities	
Decommissioning of Monitoring Network (year 100 only)	
Contractor	\$82,000
Engineer	\$68,000
Subtotal, Decommissioning of Monitoring Network (year 100 only)	\$150,000
Decommissioning of Groundwater Treatment System (year 100 only)	
Contractor	
Decommission Treatment System Equipment & Building	\$65,000
Decommission Utilities	\$48,000
Decommission Extraction Trench, Piping & Discharge Outfall	\$34,000
Subtotal, Contractor	\$150,000
Engineer	\$32,000
Subtotal, Decommissioning of Groundwater Treatment System (year 100 only)	\$180,000
Subtotal, Year 100 Construction/O&M Activities	\$330,000
Scope Contingency (15% of Year 100 O&M Activities Subtotal)	\$50,000
Bid Contingency (15% of Year 100 O&M Activities Subtotal)	\$50,000
Subtotal, Year 100 Construction/O&M Activities with Contingencies	\$430,000

Subtotal, Periodic Construction/O&M Costs **\$460,000**

Professional/Technical Services

Project Management (10% of Periodic O&M Activities Subtotal w/Contingencies)	\$46,000
Technical Support (15% of Periodic O&M Activities Subtotal w/Contingencies)	\$69,000
Five-Year Review	\$13,000

Subtotal, Professional/Technical Services **\$130,000**

TOTAL, PERIODIC COSTS **\$590,000**

TABLE D-1b.1
Cost Estimate Summary for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$1,700,000	\$1,700,000	1	\$1,700,000
Annual O&M Costs	1-100	\$36,000,000	\$360,000	14.3	\$5,140,000
Periodic Costs	5	\$49,000	\$49,000	0.713	\$35,000
Periodic Costs	10	\$49,000	\$49,000	0.508	\$25,000
Periodic Costs	15	\$49,000	\$49,000	0.362	\$17,700
Periodic Costs	20	\$49,000	\$49,000	0.258	\$12,600
Periodic Costs	25	\$49,000	\$49,000	0.184	\$9,000
Periodic Costs	30	\$49,000	\$49,000	0.131	\$6,400
Periodic Costs	35	\$49,000	\$49,000	0.0937	\$4,600
Periodic Costs	40	\$49,000	\$49,000	0.0668	\$3,300
Periodic Costs	45	\$49,000	\$49,000	0.0476	\$2,300
Periodic Costs	50	\$49,000	\$49,000	0.0339	\$1,660
Periodic Costs	55	\$49,000	\$49,000	0.0242	\$1,190
Periodic Costs	60	\$49,000	\$49,000	0.0173	\$850
Periodic Costs	65	\$49,000	\$49,000	0.0123	\$600
Periodic Costs	70	\$49,000	\$49,000	0.00877	\$430
Periodic Costs	75	\$49,000	\$49,000	0.00625	\$310
Periodic Costs	80	\$49,000	\$49,000	0.00446	\$220
Periodic Costs	85	\$49,000	\$49,000	0.00318	\$156
Periodic Costs	90	\$49,000	\$49,000	0.00227	\$111
Periodic Costs	95	\$49,000	\$49,000	0.00162	\$79
Periodic Costs	100	\$590,000	\$590,000	0.00115	\$679

TOTAL PRESENT VALUE OF ALTERNATIVE

\$7,000,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-1b.2
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS					
Construction Activities					
Implementation Plans/Submittals	1	\$86,000	Ea.	\$86,000	SHA estimate
Installation of Groundwater Treatment System					
<i>Contractor</i>					
Treatment System Equipment Installation					
<i>Equipment Installation</i>					
Equalization/settling tank	1	\$3,530	Ea.	\$3,530	Harrington Industrial Plastics, LLC, 2005; Assumes 3,000 gal. XLPE vertical storage tank.
Equalization tank water pump	1	\$2,558	Ea.	\$2,558	ECHOS 33 29 0117; 15 GPM, 1/2 HP, Transfer Pump with Motor, Valves, Piping
Hurricane Cartridge Filters	2	\$3,000	Ea.	\$6,000	SHA estimate, based on experience.
<i>pH Adjustment</i>					
HCl storage tank	1	\$2,657	Ea.	\$2,657	Harrington Industrial Plastics, LLC, 2005; Assumes 2,500 gal. XLPE vertical storage tank
HCl feed pump	1	\$906	Ea.	\$906	Harrington Industrial Plastics, LLC, 2005; Assumes PULSAtron® Electric Metering Pump; 44 gpd
Secondary containment for chemical storage	1	\$2,565	L.S.	\$2,565	SHA estimate; Assume approximately \$2/gal.
Static mixer for inline pH adjustment	1	\$125	Ea.	\$125	Harrington Industrial Plastics, LLC, 2005; Assumes Komac CPS 1-inch PVC Static Mixer
<i>Primary Metals Treatment</i>					
GreenSand filtration system & media, continuous backwash configuration	1	\$12,600	L.S.	\$12,600	SHA discussions with Siemens Corporation.
KMnO4 storage tank	1	\$144	Ea.	\$144	Harrington Industrial Plastics, LLC, 2005; Assumes 65 gal. HDLPE vertical storage tank
KMnO4 feed pump	1	\$808	Ea.	\$808	Harrington Industrial Plastics, LLC, 2005; Assumes PULSAtron® Electric Metering Pump; 12 gpd
<i>VOC Treatment</i>					
Carbon adsorption system; 2 PV 200 fiberglass adsorbers, 400 lbs virgin AC830AW acid washed water treatment carbon	1	\$3,500	L.S.	\$3,500	SHA discussions with Siemens Corporation.
<i>Secondary Metals Treatment</i>					
Ion Exchange System, (4) 3.5 C.F. vessels, Resin types include: CSO, SCC, ASG	1	\$5,120	L.S.	\$5,120	SHA discussions with Siemens Corporation.
<i>Backwash Operations</i>					
Backwash Receiving Tank	1	\$436	Ea.	\$436	Harrington Industrial Plastics, LLC, 2005; Assumes 300 gal. HDLPE vertical storage tank.
Backwash receiving tank water pump	1	\$2,558	Ea.	\$2,558	ECHOS 33 29 0117; Assumes 15 GPM, 1/2 HP, Transfer Pump with Motor, Valves, Piping.
Hurricane Cartridge Filters	2	\$3,000	Ea.	\$6,000	SHA estimate, based on experience.
<i>Miscellaneous</i>					
Air compressor for system air supply	1	\$15,516	Ea.	\$15,516	ECHOS 33 31 0204; Assumes 15 HP, 120 Gallon, 200 PSI, 50 SCFM, Air Compressor.
Equipment delivery, setup, and installation of interconnecting piping and misc. components	1	\$148,235	L.S.	\$148,235	SHA estimate; Assumes 50% of treatment system equipment costs
Subtotal, Treatment System Equipment Installation				\$210,000	\$213,258

TABLE D-1b.2
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Instrumentation					
Extraction trench sump instrumentation	1	\$4,000	L.S.	\$4,000	SHA estimate; Includes pressure gauge, level transducer, flow meter.
Equalization tank level transducer	1	\$4,750	Ea.	\$4,750	SHA estimate; Side-mounted, continuous read-out w/ 4-20 mA output signal
pH probe/controller	2	\$6,784	Ea.	\$13,568	ECHOS 33 02 1512 through 33 02 1523
NaOH tank level transducer	1	\$4,750	Ea.	\$4,750	SHA estimate; Side-mounted, continuous read-out w/ 4-20 mA output signal
HCl tank level transducer	1	\$4,750	Ea.	\$4,750	SHA estimate; Side-mounted, continuous read-out w/ 4-20 mA output signal
Backwash receiving tank level transducer	1	\$4,750	Ea.	\$4,750	SHA estimate; Side-mounted, continuous read-out w/ 4-20 mA output signal
KMnO4 tank level transducer	1	\$4,750	Ea.	\$4,750	SHA estimate; Side-mounted, continuous read-out w/ 4-20 mA output signal
Differential pressure transducers across filtration/adsorption/exchange systems	2	\$1,760	Ea.	\$3,520	ECHOS 13273 4164
Misc. high level alarm switches	3	\$692	Ea.	\$2,076	ECHOS 33 23 1306
Pressure gauges	10	\$224	Ea.	\$2,240	ECHOS 33 31 0209
Effluent flow meter	1	\$4,750	Ea.	\$4,750	SHA estimate; Side-mounted, continuous read-out w/ 4-20 mA output signal
Subtotal, Instrumentation				\$54,000	\$53,904
Electrical					
Service entry to treatment building	1	\$10,000	L.S.	\$10,000	SHA estimate, based on experience.
Treatment system equipment/instruments	1	\$100,000	L.S.	\$100,000	SHA estimate, based on experience.
Control panel	1	\$50,000	L.S.	\$50,000	SHA estimate, based on experience.
Exterior conduit/cable to extraction trench	1	\$10,000	L.S.	\$10,000	SHA estimate, based on experience.
Lighting	1	\$5,000	L.S.	\$5,000	SHA estimate, based on experience.
Subtotal, Electrical				\$180,000	\$175,000
Water Supply					
Excavating Trench, common earth, 4' to 6' deep, 1-1/2 C.Y. excavator with trench box	149	\$7	C.Y.	\$969	Means 31 23 16.13 1360; Assumes trench of approximately 400' long by 2' wide by 5' deep; Assumes H&S level C.
Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul	149	\$2	C.Y.	\$349	Means 31 23 16.13 3080; Assumes H&S level D.
Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift	149	\$8	C.Y.	\$1,241	ECHOS 17 03 0511; Assumes H&S level D.
Black seamless steel pipe, 2", Schedule 80	400	\$18	L.F.	\$7,200	McMaster-Carr, 2007.
High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"	1	\$443	Ea.	\$443	McMaster-Carr, 2007.
Underground Utility Enclosure	1	\$73	Ea.	\$73	McMaster-Carr, 2007.
Freeze-Protection Strip Heater, 12"	1	\$96	Ea.	\$96	McMaster-Carr, 2007.
BFP and Enclosure Installation	8	\$99	Hr.	\$792	ECHOS Crew Code MPLUA
Utilities Hook-up Fee	1	\$5,103	Ea.	\$5,103	SHA estimate, based on experience.
Subtotal, Water Supply				\$16,000	\$16,265
Treatment Building					
12" Structural Slab on Grade	1	\$30,000	L.S.	\$30,000	SHA estimate, based on experience; Assumes 1,050 S.F.
Pre-Engineered Steel Buildings, 35' long by 30' wide by 16' high (eave height)	1	\$70,000	L.S.	\$70,000	SHA estimate, based on experience.
Heating system	1	\$15,000	L.S.	\$15,000	SHA estimate, based on experience.
Subtotal, Treatment Building				\$120,000	\$115,000
Subtotal, Contractor				\$570,000	\$573,427
Engineer					
Labor, Oversight	880	\$99	hr	\$87,120	Assumes 4 month of field work; See Note 3.
Misc. Expenses (e.g. mileage, telephone, reproduction, postage, personal protective equipment, etc.)	1	\$13,068	l.s.	\$13,068	Assume 15% of labor cost
Subtotal, Engineer				\$100,000	\$100,188
Subtotal, Installation of Groundwater Treatment System				\$670,000	\$673,615

TABLE D-1b.2
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Install Groundwater Extraction Trench, Underground System Piping, & Surface Water Discharge Outfall					
<i>Contractor</i>					
Mobilization/Demobilization					
Mob/Demob, Loader 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Fractionation Tank	2	\$305	Ea.	\$610	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Medium Equipment	4	\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes frac tank & water truck; Assumes H&S level D.
Subtotal, Mobilization/Demobilization				\$4,300	\$4,266
Extraction Trench Excavation & Dewatering					
Strip Soil Cap & Stockpile Material, 1-1/2 C.Y. excavator, Medium Material	44	\$12	C.Y.	\$533	ECHOS 17 03 0276; Assumes H&S level C.
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	50	\$299	Hr.	\$14,950	ECHOS 17 03 0231; Assumes trench of 200' long by 3' wide by 15' deep; Assumes H&S level C.
Trench Box, Daily Rental	5	\$448	Ea.	\$2,240	ECHOS 02228 3120; Assumes trench of 200' long by 3' wide by 15' deep; Assumes H&S level C.
Water Truck	50	\$146	Hr.	\$7,300	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	600	\$0.06	S.F.	\$36	ECHOS 33 08 0585; Assumes H&S level C.
Vacuum Truck	50	\$113.00	Hr.	\$5,650	ECHOS 33 19 0111; Assumes H&S level C.
10,000 gal Fractionation Tank (coated interior)	1	\$261	Month	\$261	Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings	1	\$375	Month	\$375	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet	1	\$252	Month	\$252	Rain for Rent, Inc. Quote dated 09/24/07
pH Adjustment Chemicals	55	\$3	Gal.	\$165	SHA discussions with Harcros Chemicals, Inc.; Unit cost includes 20% mark-up for drum delivery; See supporting calculations.
Filtration system, 4-stage tandem unit, 200 gpm	1	\$2,800	Month	\$2,800	SHA discussions with N.E. Environmental Solutions, Inc.
Filtration system hoses	1	\$400	Month	\$400	SHA discussions with N.E. Environmental Solutions, Inc.
Filtration system pumps, 2" submersibles	1	\$800	Month	\$800	SHA discussions with N.E. Environmental Solutions, Inc.
Filters	40	\$8	Ea.	\$320	SHA discussions with N.E. Environmental Solutions, Inc.
Subtotal, Extraction Trench Excavation & Dewatering				\$36,000	\$36,082
Extraction Trench Construction & Backfill					
Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul	333	\$2.34	C.Y.	\$780	Means 31 23 16.13 3080; Assumes trench of 200' long by 3' width by 15' deep; Assumes H&S level D.
Pea Gravel	222	\$64	C.Y.	\$14,222	ECHOS 33 06 1042
Unclassified Fill, Delivered, Off-site	67	\$12	C.Y.	\$800	ECHOS 02223 1001
Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift	131	\$8.33	C.Y.	\$1,092	ECHOS 17 03 0511; Assumes H&S level D.
8" Diameter Perforated PVC Pipe	200	\$16	L.F.	\$3,200	ECHOS 33 26 0903
Precast, CIP Base, 4' Diameter, 15' Deep, Manhole	1	\$4,936	Ea.	\$4,936	ECHOS 19 02 0203
Submersible Stainless Steel Effluent Pump	1	\$3,000	Ea.	\$3,000	SHA estimate, based on experience.
24" Well Finish, Cover, Flush w/Grade, Manhole, Lock Cap	1	\$479	Ea.	\$479	ECHOS 33 23 2224
80 Mil Polymeric Liner, High-density Polyethylene	2,400	\$6	S.F.	\$14,400	ECHOS 33 08 0573
8 oz/sy Erosion Control/Drainage Filter Fabric (80 Mil)	580	\$2	S.Y	\$1,433	ECHOS 33 08 0532
Extraction Trench Development	1	\$1,000	L.S.	\$1,000	SHA estimate, based on experience.
Subtotal, Extraction Trench Construction & Backfill				\$45,000	\$45,342

TABLE D-1b.2
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Underground Piping Excavation					
Strip Soil Cap & Stockpile Material, 1-1/2 C.Y. excavator, Medium Material	56	\$12.00	C.Y.	\$676	ECHOS 17 03 0276; Assumes H&S level C.
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	50	\$299.00	Hr.	\$14,950	ECHOS 17 03 0231; Assumes approximately 380 feet of trench approximately 3' wide by 5' deep; Assumes H&S level C.
Trench Box, Daily Rental	5	\$448	Ea.	\$2,240	ECHOS 02228 3120; Assumes approximately 380 feet of trench approximately 3' wide by 5' deep; Assumes H&S level C.
Water Truck	24	\$146.00	Hr.	\$3,504	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	760	\$0.06	S.F.	\$46	ECHOS 33 08 0585; Assumes H&S level C.
Subtotal, Underground Piping Excavation				\$21,000	\$21,415
Underground Piping Placement & Backfill					
Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul	141	\$2.34	C.Y.	\$329	Means 31 23 16.13 3080; Assumes trench of 200' long by 3' width by 15' deep; Assumes H&S level D.
Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift	140.74	\$8.33	C.Y.	\$1,172	ECHOS 17 03 0511; Assumes H&S level D.
1" PVC, Schedule 40, Connection Piping	380	\$4.29	L.F.	\$1,630	ECHOS 33 26 0410
Subtotal, Underground Piping Placement & Backfill				\$3,100	\$3,132
Surface Water Discharge Outfall					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	24	\$215	Hr.	\$5,160	ECHOS 17 03 0231; Assumes H&S level D.
926, 2.0 CY, Wheel Loader	24	\$144	Hr.	\$3,456	ECHOS 17 03 0222; Assumes H&S level D.
Rock Cover, Riprap, Light (10 to 100 Lb Pieces)	10	\$50	C.Y.	\$500	ECHOS 18 05 0202
Pea Gravel	15	\$64.00	C.Y.	\$960	ECHOS 33 06 1042
8 oz/sy Erosion Control/Drainage Filter Fabric (80 Mil)	30	\$2	S.Y	\$74	ECHOS 33 08 0532
Cast-in-place concrete curb, wood forms, 6" x 18", straight	20	\$11	L.F.	\$220	Means 32 16 13.13 0300
Subtotal, Surface Water Discharge Outfall				\$10,000	\$10,370
Soil Stabilization					
Cement Stabilization, 6%	288.89	\$32	B.C.Y.	\$9,243	ECHOS 17 03 0602; Assumes 100% of excavated material, excluding cover material/topsoil, require stabilization; Assumes H&S level D.
Subtotal, Soil Stabilization				\$9,243	
Transportation/Disposal					
Asbestos-Impacted Soils, Non-Hazardous	433	\$80	Ton	\$34,667	SHA discussions with Waste Management, Inc.
Water, Non-Hazardous	10,000	\$0.20	Gal.	\$2,000	SHA discussions with N.E. Environmental Solutions, Inc.
Subtotal, Transportation/Disposal				\$37,000	\$36,667
Site Restoration					
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	3	\$26	M.S.F.	\$79	Means 32 92 19.13 0800
Subtotal, Site Restoration				\$79	\$79
Subtotal, Contractor				\$170,000	\$166,596
Engineer					
Labor, Oversight	220	\$99	Hr.	\$21,780	Assumes 1 month of field work; See Note 3.
Misc. Expenses (e.g. mileage, telephone, reproduction, postage, personal protective equipment, etc.)	1	\$3,267	L.S.	\$3,267	Assume 15% of labor cost
Subtotal, Engineer				\$25,000	\$25,047
Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall				\$190,000	\$191,643

TABLE D-1b.2
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Post-Construction Submittals/As-Built	1	\$43,000	Ea.	\$43,000	SHA estimate
Subtotal, Construction Activities				\$990,000	
<i>Scope Contingency (15% of Construction Activities Subtotal)</i>				\$150,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
<i>Bid Contingency (15% of Construction Activities Subtotal)</i>				\$150,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities with Contingencies				\$1,300,000	
Professional/Technical Services					
<i>Project Management (6% of Construction Activities Subtotal w/Contingencies)</i>				\$78,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
<i>Remedial Design (12% of Construction Activities Subtotal w/Contingencies)</i>				\$160,000	OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies
<i>Construction Management (8% of Construction Activities Subtotal w/Contingencies)</i>				\$100,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$340,000	
Institutional Controls					
Establish Deed Restrictions					
<i>Engineer</i>					
Establish Institutional Controls in the form of Deed Restrictions	10	\$5,000	Ea.	\$50,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				\$50,000	<i>\$50,000</i>
Subtotal, Establish Deed Restrictions				\$50,000	<i>\$50,000</i>
Subtotal, Institutional Controls				\$50,000	
TOTAL, CAPITAL COSTS				\$1,700,000	

ANNUAL O&M COSTS

O&M Activities

Groundwater Treatment System O&M

Contractor

Ion exchange resin changeouts	1	\$8,620	L.S.	\$8,620	SHA discussions with Siemens Corporation; Seimens estimated 2.5 changeouts per year.
Liquid-phase carbon changeouts	18	\$900	Ea.	\$16,200	SHA discussions with Siemens Corporation; Seimens estimated 18 changeouts per year.
pH adjustment chemicals	14000	\$2	Gal.	\$28,000	SHA discussions with Harcros Chemicals, Inc.; Unit cost assumes bulk delivery; See supporting calculations.
GreenSand regeneration chemicals	1	\$534	Ea.	\$534	SHA discussions with Harcros Chemicals, Inc.; Unit costs assume 55-gallon drums; See supporting calculations.
Filter cartridge disposal	104	\$180	Ea.	\$18,720	N.E. Environmental Solutions, Inc. 2006 Fee Schedule; Assumes 2 drums per week required for disposal of cartridges.
Extraction trench sump maintenance	1	\$1,500	L.S.	\$1,500	SHA estimate, based on experience.
Equipment maintenance	1	\$15,000	L.S.	\$15,000	SHA estimate, based on experience.
Subtotal, Contractor				\$89,000	<i>\$88,574</i>

Utilities

Electricity	1	\$5,000	L.S.	\$5,000	SHA estimate; See supporting calculations.
Subtotal, Utilities				\$5,000	<i>\$5,000</i>

TABLE D-1b.2
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

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Date: October 2007

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
<i>Engineer</i>					
Labor, Operator	121	\$990	L.S.	\$119,790	SHA estimate; Assumes approximately 2 visits per week, with additional time for unscheduled visits; See Note 3.
Labor, Monthly Reporting	12	\$1,584	Ea.	\$19,008	Unit cost assumes 16 labor hours at an average rate of \$124/hr; See Note 3.
Labor, Annual Summary Report Preparation	115	\$124	Hr.	\$14,260	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$1,663	L.S.	\$1,663	Assume 5% of office support labor cost.
Subtotal, Engineer				\$16,000	\$15,923
<i>Laboratory</i>					
Chemical analysis, VOCs by 8260B	26	\$185	Ea.	\$4,810	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 monthly influent/effluents samples & 2 semi annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, SVOCs by 8270c	26	\$360	Ea.	\$9,360	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 monthly influent/effluents samples & 2 semi annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, Metals by 200.7	26	\$240	Ea.	\$6,240	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 monthly influent/effluents samples & 2 semi annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, pH	26	\$13	Ea.	\$338	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 monthly influent/effluents samples & 2 semi annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, PCBs by 608	2	\$145	Ea.	\$290	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, TPH by 1664	2	\$150	Ea.	\$300	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, TSS by 160.2	2	\$2	Ea.	\$4	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, Total Cyanide by 4500CN	2	\$41	Ea.	\$82	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, Total Residual Chlorine by 330.1	2	\$26	Ea.	\$52	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmatory samples, consistent with RGP.
Subtotal, Laboratory				\$21,000	\$20,748
Subtotal, Groundwater Treatment System O&M				\$130,000	\$130,245

Annual Maintenance/Repair Activities

Contractor

Clearing, Medium Brush with Average Grub & Some Trees	1	\$1,254	Acre	\$1,254	ECHOS 17 01 0103; Assumes access paths to/from and areas around monitoring points will be cleared at same level of effort as one acre.
Equipment Mobilization	1	\$260	L.S.	\$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	1	\$1,275	Day	\$1,275	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" Expansion Plug	2	\$20	Ea.	\$40	Environmetal Drilling (EDI) Invoice dated 11/06/03
80# Concrete Mix	2	\$18	Ea.	\$36	Environmetal Drilling (EDI) Invoice dated 11/06/03
8" Manhole, water-tight, traffic-rated	2	\$75	Ea.	\$150	Environmetal Drilling (EDI) Invoice dated 11/06/03
Subtotal, Contractor				\$3,000	\$3,015

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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor, Oversight	10	\$99	Ea.	\$990	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$149	L.S.	\$149	Assume 15% of labor cost
Subtotal, Engineer				\$1,100	\$1,139
Subtotal, Annual Maintenance/Repair Activities				\$4,200	\$4,154
Groundwater and Surface Water Monitoring					
Engineer					
Preparation/Mobilization/Demobilization					
Labor	52	\$99	Hr.	\$5,148	SHA estimate, unit cost based on 2006 Site monitoring event
Truck rental	12	\$70	Day	\$840	Assumes Penske 16' box truck rental.
Portable Storage Unit Rental	1	\$165	Month	\$165	SHA estimate, based on experience.
Portable Eyewash Station	1.5	\$175	Week	\$263	SHA estimate, based on experience.
55-gallon steel drums	4	\$55	Ea.	\$220	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
55-gallon poly drums	2	\$60	Ea.	\$120	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Drum delivery	2	\$225	Ea.	\$450	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Dumpster rental	1	\$650	Ea.	\$650	SHA estimate; Assumes 15 CY dumpster rental for two weeks and a disposal weight of one ton.
Misc. Expenses (e.g. mileage, telephone, reproduction, postage, personal protective equipment, etc.)	1	\$773	L.S.	\$773	Assume 15% of labor cost
Subtotal, Preparation/Mobilization/Demobilization				\$8,600	\$8,629
Water Level Gauging Event					
Labor	34	\$99	Ea.	\$3,366	Based on 2006 Sampling Round Costs.
Misc. Expenses (e.g. mileage, telephone, reproduction, postage, personal protective equipment, etc.)	1	\$505	L.S.	\$505	Assume 15% of labor cost
Subtotal, Water Level Gauging Event				\$3,900	\$3,871
Sampling Event					
Labor	25	\$1,300	Location	\$32,500	SHA estimate, unit cost based on 2006 Site monitoring event
Bladder Pump	4.5	\$160	Wk.	\$720	SHA estimate, based on experience.
Bladder Pump Expendables	20	\$45	Ea.	\$900	HAS estimate; Includes teflon bladder, check balls, o-rings and grab plates.
YSI Low Flow Multi Meter	4.5	\$325	Wk.	\$1,463	SHA estimate, Assumes YSI 556 unit.
Controllor	4.5	\$245	Wk.	\$1,103	SHA estimate, based on experience.
Compressor	4.5	\$85	Wk.	\$383	SHA estimate, based on experience.
Water Level Meter	4.5	\$100	Wk.	\$450	SHA estimate; Assumes MP30 Drawdown Meter
Turbidity Meter	4.5	\$90	Wk.	\$405	SHA estimate; Assumes HACH 2100P unit.
Battery	6.5	\$25	Wk.	\$163	SHA estimate, based on experience.
Photoionization Deetector	4.5	\$390	Wk.	\$1,755	SHA estimate, based on experience.
Tubing, Bonded 1/8 x 1/4 LDPE to 1/8 x 1/4 teflon lined	1000	\$1.00	Ft.	\$1,000	SHA estimate, based on experience.
Tubing, 0.17 X 1/4 Teflon lined	20	\$0.15	Ft.	\$3	SHA estimate, based on experience.
Tubing, 1/16 X 1/8 LDPE	20	\$1.45	Ft.	\$29	SHA estimate, based on experience.
Lap Top Computer	1.5	\$90	Wk.	\$135	SHA estimate, based on experience.
Misc. Expenses (e.g. mileage, telephone, reproduction, postage, personal protective equipment, etc.)	1	\$4,875	L.S.	\$4,875	Assumes 15% of labor cost.
Subtotal, Sampling Event				\$46,000	\$45,882

TABLE D-1b.2
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Investigation-Derived Waste Disposal					
55-gallon Non-Regulated rinse water	4	\$215	Ea.	\$860	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
55-gallon high pH water	1	\$260	Ea.	\$260	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
55-gallon Methanol & water	1	\$230	Ea.	\$230	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Pick-up Fee; (manifests, fuel, insurance)	2	\$300	Ea.	\$600	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Subtotal, Investigation-Derived Waste Disposal				\$2,000	\$1,950
Subtotal, Engineer				\$60,000	\$60,332
Laboratory					
Chemical analysis, VOC by 8260B	35	\$110	Ea.	\$3,850	Alpha Woods Hole Labs 2006/2007 lab fees; See Note 4.
Chemical analysis, SVOC by 8270	35	\$155	Ea.	\$5,425	Alpha Woods Hole Labs 2006/2007 lab fees; See Note 4.
Chemical analysis, Metals	266	\$13	Ea.	\$3,458	Alpha Woods Hole Labs 2006/2007 lab fees; See Note 4.
Courier	7	\$75	Day	\$525	Alpha Woods Hole Labs 2006/2007 lab fees.
Misc. (Lab disposal fees)	1	\$127	L.S.	\$127	Assume 1 percent of total lab fees.
Subtotal, Laboratory				\$13,000	\$13,385
Contractor					
Data Validation	33	\$290	Location	\$9,570	New Environmental Horizons, Inc. costs from 2006; Unit cost based on number of sampling locations.
Subtotal, Contractor				\$9,600	\$9,570
Subtotal, Groundwater and Surface Water Monitoring				\$83,000	\$83,287
Subtotal, Annual O&M Activities Costs				\$220,000	
<i>Scope Contingency (15% Annual O&M Activities Subtotal)</i>				\$33,000	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
<i>Bid Contingency (15% Annual O&M Activities Subtotal)</i>				\$33,000	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
Subtotal, O&M Activities with Contingencies				\$290,000	
Professional/Technical Services					
<i>Project Management (10% Annual O&M Activities Subtotal w/Contingencies)</i>				\$29,000	OSWER 5-8: Assume 10% of Annual O&M Subtotal including contingencies
<i>Technical Support (15% Annual O&M Activities Subtotal w/Contingencies)</i>				\$44,000	OSWER 5-8: Assume 15% of Annual O&M Subtotal including contingencies
Subtotal, Professional/Technical Services				\$73,000	
TOTAL, ANNUAL O&M COSTS				\$360,000	

TABLE D-1b.2
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
PERIODIC COSTS					
Construction/O&M					
Every 5 Years O&M Activities					
Periodic Maintenance/Repair Activities (every 5 years)					
Contractor					
Monitoring Well Decommissioning & Replacement					
Equipment Mobilization	1	\$260	L.S.	\$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	5	\$1,275	Day	\$6,375	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" PVC Well Screen	20	\$5.50	L.F.	\$110	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" PVC Well Riser	80	\$4.00	L.F.	\$320	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" PVC End Point	2	\$7.25	Ea.	\$15	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" Expansion Plug	2	\$20	Ea.	\$40	Environmetal Drilling (EDI) Invoice dated 11/06/03
Filter Pack, silica sand	80	\$1.10	L.F.	\$88	Environmetal Drilling (EDI) Invoice dated 11/06/03
Bentonite	4	\$32	L.F.	\$128	Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Grouting	180	\$5	L.F.	\$900	Environmetal Drilling (EDI) Invoice dated 11/06/03
80# Concrete Mix	6	\$18	Ea.	\$108	Environmetal Drilling (EDI) Invoice dated 11/06/03
8" Manhole, water-tight, traffic-rated	6	\$75	Ea.	\$450	Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Roller Bit Wear, per foot	30	\$25	L.F.	\$750	Environmetal Drilling (EDI) Invoice dated 11/06/03
Drum, 55-gallon steel	1	\$55	Ea.	\$55	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Drum Transportation & Disposal, Non-Regulated Soil Cuttings	1	\$180	Ea.	\$180	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Subtotal, Monitoring Well Replacement				\$9,800	\$9,779
Update Elevation Survey					
Surveying, 2-person Crew	1	\$2,023	Day	\$2,023	ECHOS 99 04 1201
Summary Survey Report	1	\$750	L.S.	\$750	SHA estimate, based on experience.
Subtotal, Update Elevation Survey				\$2,800	\$2,773
Subtotal, Contractor				\$13,000	\$12,551
Engineer					
Labor, Oversight	55	\$99	Ea.	\$5,445	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$817	L.S.	\$817	Assumes 15% of oversight labor cost.
Labor, Summary Report Preparation	28	\$124	Hr.	\$3,472	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$174	L.S.	\$174	Assumes 5% of report preparation labor cost.
Subtotal, Engineer				\$9,900	\$9,908
Subtotal, Periodic Maintenance/Repair Activities (every 5 years)				\$22,000	\$22,459
Subtotal, Every 5 Year O&M Activities				\$22,000	
Scope Contingency (15% of Every 5 Years O&M Activities Subtotal)				\$3,300	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Bid Contingency (15% of Every 5 Years O&M Activities Subtotal)				\$3,300	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Subtotal, Every 5 Year O&M Activities with Contingencies				\$29,000	

TABLE D-1b.2
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Year 100 Construction/O&M Activities					
Decomissioning of Monitoring Network (year 100 only)					
<i>Contractor</i>					
Equipment Mobilization	1	\$260	L.S.	\$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	54	\$1,275	Day	\$68,850	Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Grouting	2,700	\$5	L.F.	\$13,500	Environmetal Drilling (EDI) Invoice dated 11/06/03
Subtotal, Contractor				\$82,000	\$82,350
<i>Engineer</i>					
Labor, Oversight	594	\$99	Hr.	\$58,806	See Note 3.
Misc. Expenses (e.g. mileage, telephone, reproduction, postage, personal protective equipment, etc.)	1	\$8,821	L.S.	\$8,821	Assume 15% of labor cost
Subtotal, Engineer				\$68,000	\$67,627
Subtotal, Decomissioning of Monitoring Network (year 100 only)				\$150,000	\$149,977
Decomissioning of Groundwater Treatment System (year 100 only)					
<i>Contractor</i>					
Decomission Treatment System Equipment & Building					
Remove/Dispose of treatment system equipment (e.g., tanks, pumps, fliter press, etc.)	1	\$53,315	L.S.	\$53,315	SHA estimate; assumes approximately 25% of cost for installation & setup.
Small building demolition	13650	\$0.36	C.F	\$4,914	Means 02 41 16.13 0500; Assumes building dimensions 35'x30'x13' (ave. height)
Transportation and disposal of building debris	30	\$70	Tons	\$1,632	SHA discussions with Waste Management, Inc.
Remove slab on grade, 9" to 12"	1050	\$2	S.F	\$2,212	ECHOS 16 01 0124
Load concrete debris, 926, 2.0 CY, Wheel Loader	8	\$204	Hr.	\$1,632	ECHOS 17 03 0222
Transportation and disposal of concrete demolition debris (with rebar)	59	\$70	Tons	\$1,632	SHA discussions with Waste Management, Inc.
Subtotal, Treatment System Equipment & Building				\$65,000	\$65,337
Decomission Utilities					
Dismantle electrical systems	1	\$43,750	L.S.	\$43,750	SHA estimate; assumes approximately 25% of cost for installation.
Dismantle water supply	1	\$4,066	L.S.	\$4,066	SHA estimate; assumes approximately 25% of cost for installation.
Subtotal, Utilities				\$48,000	\$47,816

TABLE D-1b.2
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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Decomission Extraction Trench, Piping & Discharge Outfall					
Strip Soil Cap & Stockpile Material, 1-1/2 C.Y. excavator, Medium Material	101	\$12	C.Y.	\$1,212	ECHOS 17 03 0276; Assumes H&S level C.
Excavating Trench, common earth, 14' to 20' deep, 1-1/2 C.Y. excavator with trench box	50	\$7.34	C.Y.	\$367	Means 31 23 16.13 1382; Assumes trench of 200' long by 3' wide by 15' deep; Assumes H&S level C.
Excavating Trench, common earth, 4' to 6' deep, 1-1/2 C.Y. excavator with trench box	50	\$6.50	C.Y.	\$325	Means 31 23 16.13 1360; Assumes approximately 380 feet of trench approximately 3' wide by 5' deep; Assumes H&S level C.
Water Truck	40	\$146	Hr.	\$5,840	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	1,360	\$0.06	S.F.	\$82	ECHOS 33 08 0585; Assumes H&S level C.
10,000 gal Fractionation Tank (coated interior)	1	\$87	Week	\$87	Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings	1	\$125	Week	\$125	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet	1	\$84	Week	\$84	Rain for Rent, Inc. Quote dated 09/24/07
Remove Plastic Pipe	581	\$31	L.F.	\$18,011	ECHOS 16 01 0625
Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul	474	\$2.34	C.Y.	\$1,109	Means 31 23 16.13 3080; Assumes trench of 200' long by 3' width by 15' deep; Assumes H&S level D.
Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift	474	\$8.33	C.Y.	\$3,949	ECHOS 17 03 0511; Assumes H&S level D.
Unclassified Fill, Delivered, Off-site	222	\$12	C.Y.	\$2,667	ECHOS 02223 1001
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	3	\$26	M.S.F.	\$79	Means 32 92 19.13 0800
Subtotal, Extraction Trench, Piping & Discharge Outfall				\$34,000	\$33,936
Subtotal, Contractor				\$150,000	\$147,089
Engineer					
Labor, Oversight	220	\$99	hr	\$21,780	Assumes 1 month of field work; See Note 3.
Misc. Expenses (e.g. mileage, telephone, reproduction, postage, personal protective equipment, etc.)	1	\$3,267	l.s.	\$3,267	Assume 15% of labor cost
Labor, Groundwater Treatment System Close-out Report Preparation	50	\$124	Hr.	\$6,200	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$310	L.S.	\$310	Assume 5% of report preparation labor cost.
Subtotal, Engineer				\$32,000	\$31,557
Subtotal, Decommissioning of Groundwater Treatment System (year 100 only)				\$180,000	\$178,646
Subtotal, Year 100 Construction/O&M Activities				\$330,000	
<i>Scope Contingency (15% of Year 100 O&M Activities Subtotal)</i>				\$50,000	OSWER 5-6: Assume 15% of Year 100 O&M Activities Subtotal
<i>Bid Contingency (15% of Year 100 O&M Activities Subtotal)</i>				\$50,000	OSWER 5-6: Assume 15% of Year 100 O&M Activities Subtotal
Subtotal, Year 100 Construction/O&M Activities with Contingencies				\$430,000	
Subtotal, Periodic Construction/O&M Costs				\$460,000	

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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
<i>Project Management (10% of Periodic O&M Activities Subtotal w/Contingencies)</i>				\$46,000	OSWER 5-8: Assume 10% of Periodic O&M Subtotal including contingencies
<i>Technical Support (15% of Periodic O&M Activities Subtotal w/Contingencies)</i>				\$69,000	OSWER 5-8: Assume 15% of Periodic O&M Subtotal including contingencies
Five-Year Review					
<i>Engineer</i>					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
		Subtotal, Engineer		\$13,000	<i>\$13,020</i>
		Subtotal, Five-Year Review		\$13,000	<i>\$13,020</i>
		Subtotal, Professional/Technical Services		\$130,000	
		TOTAL, PERIODIC COSTS		\$590,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sum S.F. = square feet
C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- The following assumptions were used for the former mill tailrace quantity estimates:
 - We assumed "swell" factor of 18% for excavated soils, when estimating L.C.Y. volume.
 - We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
- "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

pH ADJUSTMENT

Objective: Lower the pH of extracted groundwater to value compatible with treatment train and effluent discharge criteria.

1. Estimate concentration of hydrochloric acid (HCl) required to neutralize alkalinity.

Assumptions:

- a. Influent alkalinity concentration of 1,541 mg/L as CaCO_3 . See Appendix C.2 for discussion of estimated treatment system influent concentrations.
- b. Assume all CO_3^{-2} must be converted to HCO_3^- .

$$\text{H}^+ + \text{Cl}^- \rightleftharpoons \text{HCl}$$

$$\text{HCO}_3^- \rightleftharpoons \text{CO}_3^{-2} + \text{H}^+$$

Calculations:

- a. $1,541 \text{ mg/L } \text{CaCO}_3 * \left(\frac{2 \text{ meq/mol CaCO}_3}{100 \text{ mg/mol}} \right) = 30.8 \text{ meq/L or } 0.03 \text{ eq/L}$
- b. $[\text{HCl}] \text{ required (eq/L)} = [\text{CaCO}_3^{-2}] = 0.03 \text{ eq/L} = 0.03 \text{ mol/L}$
- c. $[\text{HCl}] = 0.03 \text{ mol/L} * 36.5 \text{ g/mol} = 1.1 \text{ g/L or } \underline{\underline{1,100 \text{ mg/L}}}$

2. Estimate concentration of HCl required to lower pH of extracted groundwater to value compatible with treatment train and effluent discharge criteria, say 7.5 S.U.

Calculations:

- a. $\text{pH} = -\log[\text{H}^+] \text{ or } [\text{H}^+] = 10^{-\text{pH}}$
- b. $[\text{H}^+] = 10^{-7.5} = 3.16 \times 10^{-8} \text{ mols/L}$
- c. $[\text{HCl}] = [\text{H}^+] = 3.16 \times 10^{-8} \text{ mols/L} * 36.5 \text{ g/mol} = 1.15 \times 10^{-6} \text{ g/L or } \underline{\underline{1.15 \times 10^{-3} \text{ mg/L}}}$

3. Estimate feed rate of HCl.

Assumptions:

- a. 1,100 mg/L (from Calculation #1) \gg $1.15 \times 10^{-3} \text{ mg/L}$ (from Calculation #2), therefore, HCl demand is driven by alkalinity of extracted groundwater.

- b. 35% by weight solution of (HCl) with a specific gravity of 1.19.
- c. Groundwater treatment system flow rate of 10 gpm. See Section 4.1.4.2 of the report.

Calculations:

a. Bulk density of HCl: $1.19 \text{ g/cm}^3 * \left(\frac{1 \text{ lb}}{453.6 \text{ g}} \right) * 3,785 \text{ cm}^3 / \text{gal} = \underline{\underline{9.9 \text{ lbs/gal}}}$

b. HCl Feed Rate: $\left(\frac{C * Q}{2,000 * \rho * \% \text{ wt}} \right)$

where, C = chemical concentration (mg/L)

Q = flowrate (gpm)

2,000 = units conversion factor

ρ = bulk density of solution (lbs/gal)

% wt = chemical weight percent of solution

HCl Feed Rate: $\left(\frac{1,100 * 10}{2,000 * 9.9 * 0.35} \right) = \underline{\underline{1.6 \text{ gal/hr, or } 14,000 \text{ gal/yr}}}$

PERMANGANATE USAGE

Objective: Regenerate GreenSand filtration media using continuous permanganate (e.g., sodium permanganate) loading and periodic backwash operations.

1. Estimate permanganate (MnO_4^-) demand for GreenSand filtration media regeneration.

Assumptions:

- a. Influent concentrations of iron and manganese are 1.84 mg/L and 0.115 mg/L, respectively. See Appendix C.2 for discussion of estimated treatment system influent concentrations.
- b. MnO_4^- demand is approximately equal to $(1 * [Fe^{+3}]) + (2 * [Mn^{+4}])$, based on information provided by Siemens Corporation, supplier of the GreenSand filtration system.

Calculations:

- a. MnO_4^- Demand: $(1 * 1.84 \text{ mg/L}) + (2 * 0.115 \text{ mg/L}) = 2.1 \text{ mg/L}$

2. Estimate feed rate of $KMnO_4$.

Assumptions:

- a. 20% by weight solution of sodium permanganate ($NaMnO_4$) with a specific gravity of 1.16.
- b. Groundwater treatment system flow rate of 10 gpm. See Section 4.1.4.2 of the report.

Calculations:

- a. Bulk density of $NaMnO_4$: $1.16 \text{ g/cm}^3 * \left(\frac{1 \text{ lb}}{453.6 \text{ g}} \right) * 3,785 \text{ cm}^3 / \text{gal} = \underline{\underline{9.7 \text{ lbs/gal}}}$

- b. $NaMnO_4$ Feed Rate: $\left(\frac{C * Q}{2,000 * \rho * \% \text{ wt}} \right)$

where, C = chemical concentration (mg/L)

Q = flowrate (gpm)

2,000 = units conversion factor

ρ = bulk density of solution (lbs/gal)

% wt = chemical weight percent of solution

$$\text{NaMnO}_4 \text{ Feed Rate: } \left(\frac{2.1 * 10}{2,000 * 9.7 * 0.20} \right) = \underline{\underline{0.0055 \text{ gal/hr, or 48 gal/yr}}}$$

3. Estimate size of backwash receiving tank.

Assumptions:

- Typical backwash rate of 12 gpm/ft², based on information provided by National Drinking Water Clearinghouse, West Virginia University.
- Typical backwash cycle run of 15 minutes per cycle, based on information provided by National Drinking Water Clearinghouse, West Virginia University.
- The cross-sectional area of GreenSand filtration vessel(s) is 1.1 ft² (vessel diameter = 14 inches), based on information provided by Siemens Corporation, supplier of the GreenSand filtration system.

Calculations:

- Backwash rate: 12 gpm/ft² * 1.1 ft² = **13.2 gpm**
- Amount of water generated during backwash cycle:
13.2 gpm * 15 mins = **198 gals**
- Backwash receiving tank size: 198 gals * 1.5 safety factor = **297 gals**

ELECTRICITY USAGE

Objective: Estimate utilities costs for proposed groundwater treatment system.

1. Estimate electricity usage for groundwater treatment system.

Assumptions:

- a. Major system components contributing to electricity demand include electrical system pumps/motors, specifically:
 - i. Extraction trench water pump (approx. ½ HP)
 - ii. Equalization tank water pump (approx. ½ HP)
 - iii. Backwash receiving tank water pump (approx. 1 HP)
 - iv. HCl chemical feed pump (approx. ½ HP)
 - v. NaMnO₄ chemical feed pump (approx. ½ HP)
 - vi. System air compressor (approx. 15 HP)
- b. Conservatively, assume that all system pumps/motors listed above operate continuously, with the exception of the system air compressor. Assume that the system air compressor runs continuously during backwash cycles, and an additional 0.5 hours per day for miscellaneous compressed air operations.
- c. Typical backwash cycle run of 15 minutes per cycle and a cycle frequency of approximately 18 hours, based on information provided by National Drinking Water Clearinghouse, West Virginia University.
- d. Assume efficiency of 3-phase motors to be 85%.

Calculations:

- a. For continuously-operating system components:

$$\text{Total Power Demand} = \left(\frac{\text{Total HP} * 0.746 \text{ kW/HP}}{0.85} \right) = \left(\frac{3 * 0.746 \text{ kW/HP}}{0.85} \right) = \underline{\underline{2.63 \text{ kW}}}$$

- b. For continuously-operating system components:

$$\begin{aligned} \text{Annual Electricity Usage} &= \text{Total Power Demand} * \text{hours of operation} \\ &= 2.63 \text{ kW} * 8,760 \text{ hr/yr} = \underline{\underline{23,065 \text{ kW-hr/yr}}} \end{aligned}$$

- c. For intermittently-operating system components:

$$\text{Total Power Demand} = \left(\frac{\text{Total HP} * 0.746 \text{ kW/HP}}{0.85} \right) = \left(\frac{15 * 0.746 \text{ kW/HP}}{0.85} \right)$$

$$1 = \underline{\underline{13.2 \text{ kW}}}$$

- d. For intermittently-operating system components:

Annual Electricity Usage = Total Power Demand * hours of operation

$$= 13.2 \text{ kW} * [(487 \text{ backwash cycles/yr} * 0.25 \text{ hrs/backwash cycle}) + (0.5 \text{ hrs/day} * 365 \text{ days/yr})]$$

$$= \underline{\underline{4,016 \text{ kW-hr/yr}}}$$

2. Estimate electricity usage for heating treatment system building.

Assumptions:

- 6,012 heating degree days (HDD) for Walpole, Massachusetts (NOAA, 2007).
- Assume proposed treatment building dimension of 35 ft x 30ft x 10ft and surface area of 2,350 ft².
- Assume R-19 insulation on walls and ceiling (rating: 19 hr-ft²-degF).

Calculations:

$$\text{a. Annual Electricity Usage: } \left(\frac{\text{Surface Area} * \text{HDD} * 24 \text{ hrs/day}}{19 \text{ hr} \cdot \text{ft}^2 \cdot \text{deg F} * 3,412 \text{ BTU} / \text{ kW} \cdot \text{hr}} \right)$$

$$\left(\frac{2,350 * 6,012 * 24 \text{ hrs/day}}{19 \text{ hr} \cdot \text{ft}^2 \cdot \text{deg F} * 3,412 \text{ BTU} / \text{ kW} \cdot \text{hr}} \right) = \underline{\underline{5,230 \text{ kW-hr}}}$$

3. Estimate annual electricity cost for operating/maintaining proposed groundwater treatment system.

Assumptions:

- Unit cost of electricity of \$0.1218 /kW-hr (EIA/DOE, 2007)
- Assume miscellaneous electricity usage (e.g., lights, minor system components, etc.) are equal to approximate 25% of estimated electricity usage (from Calculations #1 & #2).

Calculations:

- a. Total Annual Electricity Usage = Annual electricity usage for continuously-operating system components + Annual electricity usage for intermittently-operating system components + Annual electricity usage for heating system + Misc. electricity usage

$$\text{Total Annual Electricity Usage} = 23,065 \text{ kW-hr/yr} + 4,016 \text{ kW-hr/yr} + 5,230 \text{ kW-hr} + 8,078 \text{ kW-hr}$$

$$= \underline{\underline{40,389 \text{ kW-hr}}}$$

- b. Total Annual Electricity Cost = $40,389 \text{ kW-hr} * \$0.1218 / \text{kW-hr} = \$4,919$, say **\$5,000**

APPENDIX D-2
SO ALTERNATIVE COST ESTIMATES

Appendix D-2a

Cost Estimates for Alternative SO-2

TABLE D-2a.1
Cost Estimate Summary for
Alternative SO-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COST

Construction Activities

Implementation Plans/Submittals	\$11,000
Install Security Fence	
Contractor	\$110,000
Subtotal, Install Security Fence	<u>\$110,000</u>
Soil Vapor Monitoring Point Installation	
Contractor	\$2,900
Engineer	\$1,500
Subtotal, Soil Vapor Monitoring Point Installation	<u>\$4,400</u>
Post-Construction Submittals/As-Built	\$5,500
Subtotal, Construction Activities	\$130,000
Scope Contingency (15% Construction Activities Subtotal)	\$20,000
Bid Contingency (15% Construction Activities Subtotal)	\$20,000
Subtotal, Construction Activities with Contingencies	<u>\$170,000</u>

Professional/Technical Services

Project Management (8% Construction Activities Subtotal w/Contingencies)	\$14,000
Remedial Design (15% Construction Activities Subtotal w/Contingencies)	\$26,000
Construction Management (10% Construction Activities Subtotal w/Contingencies)	\$17,000
Subtotal, Professional/Technical Services	<u>\$57,000</u>

Institutional Controls

Establish Deed Restrictions	\$15,000
Subtotal, Institutional Controls	<u>\$15,000</u>

TOTAL, CAPITAL COSTS

\$240,000

ANNUAL O&M COSTS

O&M Activities

Maintain Cap/Cover	
Earthwork Contractor (Assume 1 visit annually)	
Mobilization/Demobilization	\$690
Repairs to Soil Cover	\$1,600
Pavement Restoration	\$11,200
Subtotal, Earthwork Contractor	<u>\$14,000</u>
Landscaping Contractor (Assume 2 visits annually)	\$500
Engineer	\$7,400
Subtotal, Maintain Cap/Cover	<u>\$21,000</u>

TABLE D-2a.1
Cost Estimate Summary for
Alternative SO-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Soil Vapor Monitoring	
Engineer	\$4,000
Laboratory	\$1,700
Subtotal, Soil Vapor Monitoring	\$5,700

Subtotal, O&M Activities	\$27,000
Scope Contingency (15% O&M Activities Subtotal)	\$4,100
Bid Contingency (15% O&M Activities Subtotal)	\$4,100

Subtotal, O&M Activities with Contingencies	\$35,000
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Professional/Technical Services

Project Management (10% O&M Activities Subtotal w/Contingencies)	\$3,500
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$5,300

Subtotal, Professional/Technical Services	\$8,800
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TOTAL, ANNUAL O&M COSTS	\$44,000
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PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities	
Maintain Security Fencing (every 5 years)	\$10,000

Soil Vapor Monitoring Point Maintenance (every 5 years)	
Contractor	\$2,600
Engineer	\$1,100
Subtotal, Soil Vapor Monitoring Point Maintenance (every 5 years)	\$3,800

Subtotal, Every 5 Years O&M Activities	\$14,000
Scope Contingency (15% Every 5 Years O&M Activities Subtotal)	\$2,100
Bid Contingency (15% Every 5 Years O&M Activities Subtotal)	\$2,100

Subtotal, Every 5 Years O&M Activities with Contingencies	\$18,000
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Subtotal, Construction/O&M Activities	\$18,000
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Professional/Technical Services

Project Management (10% Construction/O&M Activities Subtotal w/Contingencies)	\$1,800
Technical Support (15% Construction/O&M Activities Subtotal w/Contingencies)	\$2,700
Five-Year Review	\$13,000

Subtotal, Professional/Technical Services	\$18,000
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TOTAL, PERIODIC COSTS	\$36,000
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TABLE D-2a.1
Cost Estimate Summary for
Alternative SO-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$240,000	\$240,000	1	\$240,000
Annual O&M Costs	1-100	\$4,400,000	\$44,000	14.3	\$630,000
Periodic Costs	5	\$36,000	\$36,000	0.713	\$26,000
Periodic Costs	10	\$36,000	\$36,000	0.508	\$18,000
Periodic Costs	15	\$36,000	\$36,000	0.362	\$13,000
Periodic Costs	20	\$36,000	\$36,000	0.258	\$9,300
Periodic Costs	25	\$36,000	\$36,000	0.184	\$6,600
Periodic Costs	30	\$36,000	\$36,000	0.131	\$4,700
Periodic Costs	35	\$36,000	\$36,000	0.0937	\$3,400
Periodic Costs	40	\$36,000	\$36,000	0.0668	\$2,400
Periodic Costs	45	\$36,000	\$36,000	0.0476	\$1,700
Periodic Costs	50	\$36,000	\$36,000	0.0339	\$1,200
Periodic Costs	55	\$36,000	\$36,000	0.0242	\$870
Periodic Costs	60	\$36,000	\$36,000	0.0173	\$620
Periodic Costs	65	\$36,000	\$36,000	0.0123	\$440
Periodic Costs	70	\$36,000	\$36,000	0.00877	\$320
Periodic Costs	75	\$36,000	\$36,000	0.00625	\$230
Periodic Costs	80	\$36,000	\$36,000	0.00446	\$160
Periodic Costs	85	\$36,000	\$36,000	0.00318	\$110
Periodic Costs	90	\$36,000	\$36,000	0.00227	\$82
Periodic Costs	95	\$36,000	\$36,000	0.00162	\$58
Periodic Costs	100	\$36,000	\$36,000	0.00115	\$41

TOTAL PRESENT VALUE OF ALTERNATIVE

\$960,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-2a.2
Detailed Cost Estimate for
Alternative SO-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SO-2: Limited Action

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS					
Construction Activities					
Implementation Plans/Submittals	1	\$11,000	Ea.	\$11,000	SHA estimate
Install Security Fence					
<i>Contractor</i>					
Clearing, Medium Brush with Average Grub & Some Trees	1.3	\$1,254	Acre	\$1,630	ECHOS 17 01 0103; Assumes distance of 2,800 feet by 20 feet wide will be cleared at same level of effort as 1.3 acre.
Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	2,800	\$36	L.F.	\$100,800	Means 32 31 13.20 0500
Double swing gates, incl. posts & hardware, 20' wide, galv. steel	2	\$2,042	Ea.	\$4,084	Means 32 31 13.20 5070
Gate for 6' high fence, 1-5/8" frame, 3' wide, galv. steel	6	\$358	Ea.	\$2,148	Means 32 31 13.20 1400
Subtotal, Contractor				\$110,000	\$108,662
Subtotal, Install Security Fence				\$110,000	\$108,662
Soil Vapor Monitoring Point Installation					
<i>Contractor</i>					
Mob./Demob., Equipment & Staff	1	\$525	L.S.	\$525	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
ATV/Track-Mtd. Direct Push System, 1-2 operators, 8-hrs/day	1	\$1,495	Day	\$1,495	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor/Soil Sampling Expendable Pkg (per day)	1	\$200	Day	\$200	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor Implant Installation (includes vapor pt, screen, tubing, glass beads, bentonite seal)	4	\$95	Ea.	\$380	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Travel Costs - DP Services	2	\$150	Ea.	\$300	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Subtotal, Contractor				\$2,900	\$2,900
<i>Engineer</i>					
Labor	13	\$99	Hr.	\$1,287	See Note 3.
Misc. Field Expenses (e.g. mileage, field supplies, PPE, telephone, etc.)	1	\$194	L.S.	\$194	Assume 15% of labor cost.
Subtotal, Engineer				\$1,500	\$1,481
Subtotal, Soil Vapor Monitoring Point Installation				\$4,400	\$4,381
Post-Construction Submittals/As-Built	1	\$5,500	Ea.	\$5,500	SHA estimate
Subtotal, Construction Activities				\$130,000	
Scope Contingency (15% Construction Activities Subtotal)				\$20,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Bid Contingency (15% Construction Activities Subtotal)				\$20,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities with Contingencies				\$170,000	
Professional/Technical Services					
Project Management (8% Construction Activities Subtotal w/Contingencies)				\$14,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
Remedial Design (15% Construction Activities Subtotal w/Contingencies)				\$26,000	OSWER 5-8: Assume 15% of Construction Activities Subtotal including contingencies
Construction Management (10% Construction Activities Subtotal w/Contingencies)				\$17,000	OSWER 5-8: Assume 10% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$57,000	

TABLE D-2a.2
Detailed Cost Estimate for
Alternative SO-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SO-2: Limited Action

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Institutional Controls					
Establish Deed Restrictions					
<i>Engineer</i>					
Establish Institutional Controls in the form of Deed Restrictions	3	\$5,000	Ea.	\$15,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				\$15,000	
Subtotal, Establish Deed Restrictions				\$15,000	
Subtotal, Institutional Controls				\$15,000	
TOTAL, CAPITAL COSTS				\$240,000	

ANNUAL O&M COSTS

O&M Activities

Maintain Cap/Cover

Earthwork Contractor (Assume 1 visit annually)

Mobilization/Demobilization					
Crew, 100 miles, per person	2	\$192	Ea.	\$384	ECHOS 33 01 0204
Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; assumes 50 miles per mob/demob
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801
Subtotal, Mobilization/Demobilization				\$690	\$688

Repairs to Soil Cover

Bobcat	8	\$126	Hr.	\$1,008	ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	10	\$55	C.Y.	\$550	ECHOS 08 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	0.8	\$27	M.S.F.	\$22	Means 32 92 19.13 0800
Subtotal, Repairs to Soil Cover				\$1,600	\$1,580

Pavement Restoration

Pavement removal, Bituminous driveways	291	\$5.71	S.Y.	\$1,662	Means 02 41 13.17 5100; Assumes 5% of paved area is replaced annually.
Transportation & Disposal, Asphalt	36	\$25	Ton	\$906	SHA discussions with Waste Management, Inc.
Asphaltic Concrete Pavement, Lots & Driveways, 6"	2,611	\$2.93	S.F.	\$7,650	Means 32 12 16.14 0020; Assumes 5% of paved area is replaced annually.
Hauling, 20 C.Y. dump truck, 20 mile round trip	73	\$14	L.C.Y	\$1,015	Means 31 23 23.18 1255
Subtotal, Pavement Restoration				\$11,200	\$11,234
Subtotal, Earthwork Contractor				\$14,000	\$13,501

Landscaping Contractor (Assume 2 visits annually)

Mowing, 1st event	1	\$250.00	M.S.F.	\$250	SHA estimate.
Mowing, 2nd event	1	\$250.00	M.S.F.	\$250	SHA estimate.
Subtotal, Landscaping Contractor				\$500	\$500

Engineer

Labor, Quarterly Inspections	4	\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate of \$99/hr. See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$594	L.S.	\$594	Assume 15% of field labor cost.
Labor, Annual Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$137	L.S.	\$137	Assume 5% of report preparation labor cost.
Subtotal, Engineer				\$7,400	\$7,419
Subtotal, Maintain Cap/Cover				\$21,000	\$21,420

TABLE D-2a.2
Detailed Cost Estimate for
Alternative SO-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SO-2: Limited Action

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Soil Vapor Monitoring					
<i>Engineer</i>					
Labor, Soil Vapor Sampling	10	\$99	Hr.	\$990	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$149	L.S.	\$149	Assume 15% of labor cost.
Labor, Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$136	L.S.	\$136	Assume 5% of labor cost.
Subtotal, Engineer				\$4,000	\$4,003
<i>Laboratory</i>					
Chemical analysis, VOCs (Method TO-15)	6	\$285	Ea.	\$1,710	2006-2007 Fee Schedule, Alpha Woods Hole Labs. Includes equipment rental.
Subtotal, Laboratory				\$1,700	\$1,710
Subtotal, Soil Vapor Monitoring				\$5,700	\$5,713
Subtotal, O&M Activities				\$27,000	
<i>Scope Contingency (15% O&M Activities Subtotal)</i>				\$4,100	OSWER 5-6: Assume 15% of O&M Activities Subtotal
<i>Bid Contingency (15% O&M Activities Subtotal)</i>				\$4,100	OSWER 5-6: Assume 15% of O&M Activities Subtotal
Subtotal, O&M Activities with Contingencies				\$35,000	
Professional/Technical Services					
<i>Project Management (10% O&M Activities Subtotal w/Contingencies)</i>				\$3,500	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
<i>Technical Support (15% O&M Activities Subtotal w/Contingencies)</i>				\$5,300	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$8,800	
TOTAL, ANNUAL O&M COSTS				\$44,000	

PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities

Maintain Security Fencing (every 5 years)

Contractor

Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	280	\$36	L.F.	\$10,080	Means 32 31 13.20 0500; Assumes 10% of security fence is repaired every five years.
Subtotal, Contractor				\$10,000	\$10,080
Subtotal, Maintain Existing Security Fence (every 5 years)				\$10,000	\$10,080

Soil Vapor Monitoring Point Maintenance (every 5 years)

Contractor

Mob./Demob., Equipment & Staff	1	\$525	L.S.	\$525	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
ATV/Track-Mtd. Direct Push System, 1-2 operators, 8-hrs/day	1	\$1,495	Day	\$1,495	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor/Soil Sampling Expendable Pkg (per day)	1	\$200	Day	\$200	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor Implant Installation (includes vapor pt, screen, tubing, glass beads, bentonite seal)	1	\$95	Ea.	\$95	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Travel Costs - DP Services	2	\$150	Ea.	\$300	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Subtotal, Contractor				\$2,600	\$2,615

TABLE D-2a.2
Detailed Cost Estimate for
Alternative SO-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SO-2: Limited Action

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor	10	\$99	Hr.	\$990	See Note 3.
Misc. Field Expenses (e.g. mileage, field supplies, PPE, telephone, etc.)	1	\$149	L.S.	\$149	Assume 15% of labor cost.
Subtotal, Engineer				\$1,100	<i>\$1,139</i>
Subtotal, Soil Vapor Monitoring Point Maintenance (every 5 years)				\$3,800	<i>\$3,754</i>
Subtotal, Every 5 Years O&M Activities				\$14,000	
<i>Scope Contingency (15% Every 5 Years O&M Activities Subtotal)</i>				\$2,100	OSWER 5-6: Assume 15% of Periodic Every 5 Years O&M Activities Subtotal
<i>Bid Contingency (15% Every 5 Years O&M Activities Subtotal)</i>				\$2,100	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Subtotal, Every 5 Years O&M Activities with Contingencies				\$18,000	
Subtotal, Construction/O&M Activities				\$18,000	
Professional/Technical Services					
<i>Project Management (10% Construction/O&M Activities Subtotal w/Contingencies)</i>				\$1,800	OSWER 5-8: Assume 10% of Construction/O&M Activities Subtotal (including contingencies)
<i>Technical Support (15% Construction/O&M Activities Subtotal w/Contingencies)</i>				\$2,700	OSWER 5-8: Assume 15% of Construction/O&M Activities Subtotal (including contingencies)
Five-Year Review					
Engineer					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
Subtotal, Engineer				\$13,000	<i>\$13,020</i>
Subtotal, Five-Year Review				\$13,000	<i>\$13,020</i>
Subtotal, Professional/Technical Services				\$18,000	
TOTAL, PERIODIC COSTS				\$36,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sum S.F. = square feet
C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- Laboratory costs for soil vapor sampling assume analysis of 6 (4 primary samples, 1 duplicate and 1 ambient air sample) soil vapor samples (VOCs by USEPA Method TO-15, 2-methylnaphthalene by MADEP APH Method). Laboratory unit costs based on 2006 - 2007 Fee Schedule for Alpha Woods Hole Labs (AWHL) of Raynham, Massachusetts.
- "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

Appendix D-2b

Cost Estimates for Alternative SO-3

TABLE D-2b.1
Cost Estimate Summary for
Alternative SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos \geq 1%
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COSTS

Construction Activities

Implementation Plans/Submittals	\$10,000
Soil Vapor Monitoring Point Installation	
Contractor	\$2,900
Engineer	\$1,500
Subtotal, Soil Vapor Monitoring Point Installation	<u>\$4,400</u>
Install Passive Barrier & Sub-Slab Depressurization System	
Contractor	\$45,000
Engineer	\$6,300
Subtotal, Install Passive Barrier & Sub-Slab Depressurization System	<u>\$51,300</u>
Post-Construction Submittals/As-Built	\$5,000
Subtotal, Construction Activities	\$71,000
Scope Contingency (15% Construction Activities Subtotal)	\$11,000
Bid Contingency (15% Construction Activities Subtotal)	\$11,000
Subtotal, Construction Activities with Contingencies	<u>\$90,000</u>

Professional/Technical Services

Project Management (10% Construction Activities Subtotal w/Contingencies)	\$9,000
Remedial Design (20% Construction Activities Subtotal w/Contingencies)	\$18,000
Construction Management (15% Construction Activities Subtotal w/Contingencies)	\$14,000
Subtotal, Professional/Technical Services	<u>\$41,000</u>

Institutional Controls

Establish Deed Restrictions	\$15,000
Subtotal, Institutional Controls	<u>\$15,000</u>

TOTAL, CAPITAL COSTS

\$150,000

TABLE D-2b.1
Cost Estimate Summary for
Alternative SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos \geq 1%
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

ANNUAL O&M COSTS

O&M Activities

Maintain Existing Cap/Cover

Earthwork Contractor (Assume 1 visit annually)

Mobilization/Demobilization

\$690

Pavement Restoration

\$140

Subtotal, Earthwork Contractor

\$830

Engineer

\$7,400

Subtotal, Maintain Existing Cap/Cover

\$8,200

Subtotal, O&M Activities Costs

\$8,200

Scope Contingency (15% O&M Activities Subtotal)

\$1,200

Bid Contingency (15% O&M Activities Subtotal)

\$1,200

Subtotal, O&M Activities with Contingencies

\$11,000

Professional/Technical Services

Project Management (10% Periodic Construction/O&M Activities Subtotal
w/Contingencies)

\$1,100

Technical Support (15% Periodic Construction/O&M Activities Subtotal w/Contingencies)

\$1,650

Subtotal, Professional/Technical Services

\$2,800

TOTAL, ANNUAL O&M COSTS

\$14,000

TABLE D-2b.1
Cost Estimate Summary for
Alternative SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos \geq 1%
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PERIODIC COSTS

Construction/O&M Activities

Years 1 through 10 O&M Activities

Soil Vapor Monitoring (years 1 through 10 only)

Engineer \$4,000

Laboratory \$1,700

Subtotal, Soil Vapor Monitoring (years 1 through 10 only) \$5,700

Indoor Air Monitoring & System Operation (years 1 through 10 only)

Indoor Air Monitoring Costs

Engineer \$2,800

Laboratory \$1,100

Subtotal, Indoor Air Monitoring \$4,000

System Operating Costs

Utilities \$250

Subtotal, System Operating Costs \$250

Subtotal, Indoor Air Monitoring & System Operation (years 1 through 10 only) \$4,200

Subtotal, Years 1 through 10 O&M Activities \$9,900

Scope Contingency (15% Years 1 through 10 O&M Activities Subtotal) \$1,500

Bid Contingency (15% Years 1 through 10 O&M Activities Subtotal) \$1,500

Subtotal, Years 1 through 10 O&M Activities with Contingencies \$13,000

Years 5 and 10 O&M Activities

Soil Vapor Monitoring Point Maintenance (years 5 and 10 only)

Contractor \$2,600

Engineer \$1,100

Subtotal, Soil Vapor Monitoring Point Maintenance (years 5 and 10 only) \$3,800

Sub-Slab Depressurization System Maintenance (years 5 and 10 only)

Contractor \$860

Subtotal, Sub-Slab Depressurization System Maintenance (years 5 and 10 only) \$860

Subtotal, Years 5 and 10 O&M Activities \$4,700

Scope Contingency (15% Years 5 and 10 O&M Activities Subtotal) \$700

Bid Contingency (15% Years 5 and 10 O&M Activities Subtotal) \$710

Subtotal, Years 5 and 10 O&M Activities with Contingencies \$6,100

Subtotal, Periodic O&M Activities with Contingencies \$19,000

Professional/Technical Services

Project Management (10% Periodic O&M Activities Subtotal w/Contingencies) \$1,900

Technical Support (15% Periodic O&M Activities Subtotal w/Contingencies) \$2,900

Five-Year Review \$13,000

Subtotal, Professional/Technical Services \$18,000

TOTAL, PERIODIC COSTS \$37,000

TABLE D-2b.1
Cost Estimate Summary for
Alternative SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos \geq 1%
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$150,000	\$150,000	1	\$150,000
Annual O&M Costs	1-100	\$1,400,000	\$14,000	14.3	\$200,000
Periodic Costs	1	\$16,000	\$16,000	0.935	\$15,000
Periodic Costs	2	\$16,000	\$16,000	0.873	\$14,000
Periodic Costs	3	\$16,000	\$16,000	0.816	\$13,000
Periodic Costs	4	\$16,000	\$16,000	0.763	\$12,000
Periodic Costs	5	\$37,000	\$37,000	0.713	\$26,000
Periodic Costs	6	\$16,000	\$16,000	0.666	\$11,000
Periodic Costs	7	\$16,000	\$16,000	0.623	\$10,000
Periodic Costs	8	\$16,000	\$16,000	0.582	\$9,000
Periodic Costs	9	\$16,000	\$16,000	0.544	\$9,000
Periodic Costs	10	\$37,000	\$37,000	0.508	\$19,000
Periodic Costs	15	\$13,000	\$13,000	0.362	\$5,000
Periodic Costs	20	\$13,000	\$13,000	0.258	\$3,400
Periodic Costs	25	\$13,000	\$13,000	0.184	\$2,400
Periodic Costs	30	\$13,000	\$13,000	0.131	\$1,700
Periodic Costs	35	\$13,000	\$13,000	0.0937	\$1,200
Periodic Costs	40	\$13,000	\$13,000	0.0668	\$900
Periodic Costs	45	\$13,000	\$13,000	0.0476	\$600
Periodic Costs	50	\$13,000	\$13,000	0.0339	\$400
Periodic Costs	55	\$13,000	\$13,000	0.0242	\$310
Periodic Costs	60	\$13,000	\$13,000	0.0173	\$220
Periodic Costs	65	\$13,000	\$13,000	0.0123	\$160
Periodic Costs	70	\$13,000	\$13,000	0.00877	\$110
Periodic Costs	75	\$13,000	\$13,000	0.00625	\$80
Periodic Costs	80	\$13,000	\$13,000	0.00446	\$60
Periodic Costs	85	\$13,000	\$13,000	0.00318	\$40
Periodic Costs	90	\$13,000	\$13,000	0.00227	\$30
Periodic Costs	95	\$13,000	\$13,000	0.00162	\$21
Periodic Costs	100	\$13,000	\$13,000	0.00115	\$15

TOTAL PRESENT VALUE OF ALTERNATIVE

\$500,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-2b.2
Detailed Cost Estimate for
Alternative SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos ≥ 1%
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos ≥ 1%

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS					
Construction Activities					
Implementation Plans/Submittals	1	\$10,000	Ea.	\$10,000	SHA Estimate
Soil Vapor Monitoring Point Installation					
<i>Contractor</i>					
Mob./Demob., Equipment & Staff	1	\$525	L.S.	\$525	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
ATV/Track-Mtd. Direct Push System, 1-2 operators, 8-hrs/day	1	\$1,495	Day	\$1,495	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor/Soil Sampling Expendable Pkg (per day)	1	\$200	Day	\$200	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor Implant Installation (includes vapor pt, screen, tubing, glass beads, bentonite seal)	4	\$95	Ea.	\$380	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Travel Costs - DP Services	2	\$150	Ea.	\$300	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Subtotal, Contractor				\$2,900	\$2,900
<i>Engineer</i>					
Labor	13	\$99	Hr.	\$1,287	See Note 3.
Misc. Field Expenses (e.g. mileage, field supplies, PPE, telephone, etc.)	1	\$194	L.S.	\$194	Assume 15% of labor cost.
Subtotal, Engineer				\$1,500	\$1,481
Subtotal, Soil Vapor Monitoring Point Installation				\$4,400	\$4,381
Install Passive Barrier & Sub-Slab Depressurization System					
<i>Contractor</i>					
Passive Barrier, new construction	5,000	\$4.00	S.F.	\$20,000	ITRC, 2007.
Sub-slab Depressurization System	5,000	\$5.00	S.F.	\$25,000	ITRC, 2007.
Subtotal, Contractor				\$45,000	\$45,000
<i>Engineer</i>					
Labor, Oversight	55	\$99	Hr.	\$5,445	Assumes 1 week of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$817	L.S.	\$817	Assume 15% of labor cost
Subtotal, Engineer				\$6,300	\$6,262
Subtotal, Install Passive Barrier & Sub-Slab Depressurization System				\$51,300	\$51,262
Post-Construction Submittals/As-Builts	1	\$5,000	Ea.	\$5,000	SHA Estimate
Subtotal, Construction Activities				\$71,000	
Scope Contingency (15% Construction Activities Subtotal)				\$11,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Bid Contingency (15% Construction Activities Subtotal)				\$11,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities with Contingencies				\$90,000	
Professional/Technical Services					
Project Management (10% Construction Activities Subtotal w/Contingencies)				\$9,000	OSWER 5-8: Assume 10% of Construction Activities Subtotal including contingencies
Remedial Design (20% Construction Activities Subtotal w/Contingencies)				\$18,000	OSWER 5-8: Assume 20% of Construction Activities Subtotal including contingencies
Construction Management (15% Construction Activities Subtotal w/Contingencies)				\$14,000	OSWER 5-8: Assume 15% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$41,000	

TABLE D-2b.2
Detailed Cost Estimate for
Alternative SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos ≥ 1%
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos ≥ 1%

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Institutional Controls					
Establish Deed Restrictions					
<i>Engineer</i>					
Establish Institutional Controls in the form of Deed Restrictions	3	\$5,000	Ea.	\$15,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				\$15,000	\$15,000
Subtotal, Establish Deed Restrictions				\$15,000	\$15,000
Subtotal, Institutional Controls				\$15,000	
TOTAL, CAPITAL COSTS				\$150,000	

ANNUAL O&M COSTS

O&M Activities

Maintain Existing Cap/Cover

Earthwork Contractor (Assume 1 visit annually)

Mobilization/Demobilization					
Crew, 100 miles, per person	2	\$192	Ea.	\$384	ECHOS 33 01 0204
Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; assumes 50 miles per mob/demob
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801
Subtotal, Mobilization/Demobilization				\$690	\$688
Pavement Restoration					
Pavement removal, Bituminous driveways	3	\$5.71	S.Y.	\$18	Means 02 41 13.17 5100
Transportation & Disposal, Asphalt	1	\$25	Ton	\$25	SHA discussions with Waste Management, Inc.
Asphaltic Concrete Pavement, Lots & Driveways, 6" stone base, 2" binder course, 1" topping	27	\$2.93	S.F.	\$80	Means 32 12 16.14 0020
Hauling, 20 C.Y. dump truck, 20 mile round trip	1	\$14	L.C.Y	\$14	Means 31 23 23.18 1255
Subtotal, Pavement Restoration				\$140	\$137
Subtotal, Earthwork Contractor				\$830	\$825

Engineer

Labor, Quarterly Inspections	4	\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate of \$99/hr. See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$594	L.S.	\$594	Assume 15% of field labor cost.
Labor, Annual Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$137	L.S.	\$137	Assume 5% of report preparation labor cost.
Subtotal, Engineer				\$7,400	\$7,419
Subtotal, Maintain Existing Cap/Cover				\$8,200	\$8,244
Subtotal, O&M Activities Costs				\$8,200	
<i>Scope Contingency (15% O&M Activities Subtotal)</i>				\$1,200	OSWER 5-6: Assume 15% of O&M Activities Subtotal
<i>Bid Contingency (15% O&M Activities Subtotal)</i>				\$1,200	OSWER 5-6: Assume 15% of O&M Activities Subtotal
Subtotal, O&M Activities with Contingencies				\$11,000	

TABLE D-2b.2
Detailed Cost Estimate for
Alternative SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos ≥ 1%
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos ≥ 1%

DESCRIPTION	QTY	UNIT	COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services						
<i>Project Management (10% Periodic Construction/O&M Activities Subtotal w/Contingencies)</i>					\$1,100	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
<i>Technical Support (15% Periodic Construction/O&M Activities Subtotal w/Contingencies)</i>					\$1,650	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Subtotal, Professional/Technical Services					\$2,800	
TOTAL, ANNUAL O&M COSTS					\$14,000	

PERIODIC COSTS

Construction/O&M Activities

Years 1 through 10 O&M Activities

Soil Vapor Monitoring (years 1 through 10 only)

Engineer

Labor, Soil Vapor Sampling	10	\$99	Hr.	\$990	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$149	L.S.	\$149	Assume 15% of labor cost.
Labor, Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$136	L.S.	\$136	Assume 5% of labor cost.
Subtotal, Engineer				\$4,000	\$4,003

Laboratory

Chemical analysis, VOCs (Method TO-15)	6	\$285	Ea.	\$1,710	2006-2007 Fee Schedule, Alpha Woods Hole Labs. Includes equipment rental.
Subtotal, Laboratory				\$1,700	\$1,710

Subtotal, Soil Vapor Monitoring (years 1 through 10 only) \$5,700 \$5,713

Indoor Air Monitoring & System Operation (years 1 through 10 only)

Indoor Air Monitoring Costs

Engineer

Labor, Indoor Air Sampling	10	\$99	Hr.	\$990	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$149	L.S.	\$149	Assume 15% of labor cost.
Labor, Summary Report Preparation	13	\$124	Hr.	\$1,612	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$81	L.S.	\$81	Assume 5% of labor cost.
Subtotal, Engineer				\$2,800	\$2,832

Laboratory

Chemical analysis, VOCs (Method TO-15)	4	\$285	Ea.	\$1,140	2006-2007 Fee Schedule, Alpha Woods Hole Labs. Includes equipment rental.
Subtotal, Laboratory				\$1,100	\$1,140
Subtotal, Indoor Air Monitoring				\$4,000	\$3,972

System Operating Costs

Utilities

Blower Electricity	1	\$250	Year	\$250	SHAestimate. Assumes in-line centrifugal blower, single-phase, 1/4 Hp
Subtotal, Utilities				\$250	\$250
Subtotal, System Operating Costs				\$250	\$250

Subtotal, Indoor Air Monitoring & System Operation (years 1 through 10 only) \$4,200 \$4,222

TABLE D-2b.2
Detailed Cost Estimate for
Alternative SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos ≥ 1%
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos ≥ 1%

DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Subtotal, Years 1 through 10 O&M Activities				\$9,900	
<i>Scope Contingency (15% Years 1 through 10 O&M Activities Subtotal)</i>				\$1,500	OSWER 5-6: Assume 15% of Years 1 through 10 O&M Activities Subtotal
<i>Bid Contingency (15% Years 1 through 10 O&M Activities Subtotal)</i>				\$1,500	OSWER 5-6: Assume 15% of Years 1 through 10 O&M Activities Subtotal
Subtotal, Years 1 through 10 O&M Activities with Contingencies				\$13,000	

Years 5 and 10 O&M Activities

Soil Vapor Monitoring Point Maintenance (years 5 and 10 only)

Contractor

Mob./Demob., Equipment & Staff	1	\$525	L.S.	\$525	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
ATV/Track-Mtd. Direct Push System, 1-2 operators, 8-hrs/day	1	\$1,495	Day	\$1,495	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor/Soil Sampling Expendable Pkg (per day)	1	\$200	Day	\$200	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor Implant Installation (includes vapor pt, screen, tubing, glass beads, bentonite seal)	1	\$95	Ea.	\$95	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Travel Costs - DP Services	2	\$150	Ea.	\$300	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Subtotal, Contractor				\$2,600	\$2,615

Engineer

Labor	10	\$99	Hr.	\$990	See Note 3.
Misc. Field Expenses (e.g. mileage, field supplies, PPE, telephone, etc.)	1	\$149	L.S.	\$149	Assume 15% of labor cost.
Subtotal, Engineer				\$1,100	\$1,139

Subtotal, Soil Vapor Monitoring Point Maintenance (years 5 and 10 only) **\$3,800** **\$3,754**

Sub-Slab Depressurization System Maintenance (years 5 and 10 only)

Contractor

Replacement Blower, in-line centrifugal, single-phase, 1/4 Hp	1	\$555	Ea.	\$555	Grainger Industrial Supply, 2007.
Labor	4	\$75	Hr.	\$300	SHA estimate.
Subtotal, Contractor				\$860	\$855

Subtotal, Sub-Slab Depressurization System Maintenance (years 5 and 10 only) **\$860** **\$855**

Subtotal, Years 5 and 10 O&M Activities **\$4,700**

<i>Scope Contingency (15% Years 5 and 10 O&M Activities Subtotal)</i>				\$700	OSWER 5-6: Assume 15% of Years 5 and 10 O&M Activities Subtotal
<i>Bid Contingency (15% Years 5 and 10 O&M Activities Subtotal)</i>				\$710	OSWER 5-6: Assume 15% of Years 5 and 10 O&M Activities Subtotal
Subtotal, Years 5 and 10 O&M Activities with Contingencies				\$6,100	

Subtotal, Periodic O&M Activities with Contingencies **\$19,000**

TABLE D-2b.2
Detailed Cost Estimate for
Alternative SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos ≥ 1%
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SO-3: Vapor Intrusion Mitigation and Capping of Soil with Asbestos ≥ 1%

DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (10% Periodic O&M Activities Subtotal w/Contingencies)				\$1,900	OSWER 5-8: Assume 10% of Periodic O&M Activities Subtotal including contingencies
Technical Support (15% Periodic O&M Activities Subtotal w/Contingencies)				\$2,900	OSWER 5-8: Assume 15% of Periodic O&M Activities Subtotal including contingencies
Five-Year Review					
Engineer					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
Subtotal, Engineer				\$13,000	\$13,020
Subtotal, Five-Year Review				\$13,000	
Subtotal, Professional/Technical Services				\$18,000	
TOTAL, PERIODIC COSTS				\$37,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sum S.F. = square feet
C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- Laboratory costs for soil vapor sampling assume analysis of 6 (4 primary samples, 1 duplicate and 1 ambient air sample) soil vapor samples (VOCs by USEPA Method TO-15, 2-methylnaphthalene by MADEP APH Method). Laboratory unit costs based on 2006 - 2007 Fee Schedule for Alpha Woods Hole Labs (AWHL) of Raynham, Massachusetts.
- ITRC (Interstate Technology & Regulatory Council). 2007. Vapor Intrusion Pathway: A Practical Guideline. VI-1. Washington, D.C.: Interstate Technology & Regulatory Council, Vapor Intrusion Team. www.itrcweb.org.
- Laboratory costs for indoor air sampling assume analysis of 4 (2 primary samples, 1 duplicate, and 1 ambient air sample) soil vapor samples (VOCs by USEPA Method TO-15, 2-methylnaphthalene by MADEP APH Method). Laboratory unit costs based on 2006 - 2007 Fee Schedule for Alpha Woods Hole Labs (AWHL) of Raynham, Massachusetts.
- Grainger Industrial Supply, 2007. On-line catalog available at <http://www.grainger.com/Grainger/www/start.shtml>.
- "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- All subtotals and total are rounded to 2 significant numbers. The number presented italics to the right of rounded subtotals is the unrounded summed value.

Appendix D-2c

Cost Estimates for Alternative SO-4

Note that this appendix includes costs which have been updated using those originally presented in the Draft FS (SHA, 2007) for alternative SO-4. An error in the original contingency costs was corrected.

TABLE D-2c.1
Cost Estimate Summary for
Alternative SO-4: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COSTS

Construction Activities

Implementation Plans/Submittals	\$10,000
Limited Excavation	
Contractor	
Mobilization/Demobilization	\$4,900
Site Preparation	\$2,000
Excavation	\$14,000
Backfill	\$16,000
Site Restoration	\$7,000
Soil Stabilization	\$4,500
Transportation/Disposal	\$41,000
Subtotal, Contractor	<u>\$89,000</u>
Engineer	\$6,300
Laboratory	\$4,100
Subtotal, Limited Excavation	<u><u>\$100,000</u></u>
Post-Construction Submittals/As-Builts	\$5,000
Subtotal, Construction Activities	\$115,000
Scope Contingency (15% Construction Activities Subtotal)	\$17,000
Bid Contingency (15% Construction Activities Subtotal)	\$17,000
Subtotal, Construction Activities with Contingencies	<u><u>\$150,000</u></u>

Professional/Technical Services

Project Management (8% Construction Activities Subtotal w/Contingencies)	\$12,000
Remedial Design (15% Construction Activities Subtotal w/Contingencies)	\$23,000
Construction Management (10% Construction Activities Subtotal w/Contingencies)	\$15,000
Subtotal, Professional/Technical Services	<u><u>\$50,000</u></u>

Institutional Controls

Establish Deed Restrictions	\$15,000
Subtotal, Institutional Controls	<u><u>\$15,000</u></u>

TOTAL, CAPITAL COSTS

\$220,000

TABLE D-2c.1
Cost Estimate Summary for
Alternative SO-4: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PERIODIC COSTS

Professional/Technical Services

Five-Year Review

Subtotal, Professional/Technical Services

\$13,000

\$13,000

TOTAL, PERIODIC COSTS

\$13,000

PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$220,000	\$220,000	1	\$20,000
Annual O&M Costs	1-100	\$0	\$0	14.3	\$0
Periodic Costs	5	\$13,000	\$13,000	0.713	\$9,000
Periodic Costs	10	\$13,000	\$13,000	0.508	\$7,000
Periodic Costs	15	\$13,000	\$13,000	0.362	\$5,000
Periodic Costs	20	\$13,000	\$13,000	0.258	\$3,400
Periodic Costs	25	\$13,000	\$13,000	0.184	\$2,400
Periodic Costs	30	\$13,000	\$13,000	0.131	\$1,700
Periodic Costs	35	\$13,000	\$13,000	0.0937	\$1,200
Periodic Costs	40	\$13,000	\$13,000	0.0668	\$900
Periodic Costs	45	\$13,000	\$13,000	0.0476	\$600
Periodic Costs	50	\$13,000	\$13,000	0.0339	\$400
Periodic Costs	55	\$13,000	\$13,000	0.0242	\$310
Periodic Costs	60	\$13,000	\$13,000	0.0173	\$220
Periodic Costs	65	\$13,000	\$13,000	0.0123	\$160
Periodic Costs	70	\$13,000	\$13,000	0.00877	\$110
Periodic Costs	75	\$13,000	\$13,000	0.00625	\$80
Periodic Costs	80	\$13,000	\$13,000	0.00446	\$60
Periodic Costs	85	\$13,000	\$13,000	0.00318	\$40
Periodic Costs	90	\$13,000	\$13,000	0.00227	\$30
Periodic Costs	95	\$13,000	\$13,000	0.00162	\$21
Periodic Costs	100	\$13,000	\$13,000	0.00115	\$15

TOTAL PRESENT VALUE OF ALTERNATIVE

\$250,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-2c.2
Detailed Cost Estimate for
Alternative SO-4: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

SO-4: Limited Excavation

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS					
Construction Activities					
Implementation Plans/Submittals	1	\$10,000	Ea.	\$10,000	SHA estimate
Limited Excavation					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader, Compactor, 70 to 150 HP	4	\$417	Ea.	\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.
Subtotal, Mobilization/Demobilization				\$4,900	\$4,898
Site Preparation					
Pavement removal, Bituminous driveways	234	\$6	S.Y.	\$1,336	Means 02 41 13.17 5100
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5'	150	\$4.28	L.F.	\$642	ECHOS 18 05 0206
Subtotal, Site Preparation				\$2,000	\$1,978
Excavation					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	24	\$215	Hr.	\$5,160	ECHOS 17 03 0231; Assumes H&S level D.
926, 2.0 CY, Wheel Loader	24	\$144	Hr.	\$3,456	ECHOS 17 03 0222; Assumes H&S level D.
Bobcat	24	\$126	Hr.	\$3,024	ECHOS Crew Code COBBC; Assumes H&S level D.
Water Truck	24	\$103	Hr.	\$2,472	ECHOS Crew Code COKBM (Modified); Assumes H&S level D.
Sprayed Water Dust Suppressant	2,100	\$0.05	S.F.	\$105	ECHOS 33 08 0585; Assumes H&S level D.
Subtotal, Excavation				\$14,000	\$14,217
Backfill					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	16	\$199	Hr.	\$3,184	ECHOS 17 03 0231
926, 2.0 CY, Wheel Loader	16	\$130	Hr.	\$2,080	ECHOS 17 03 0222
Vibratory Sheepsfoot Roller, 13 Ton, 66" Wide	16	\$344	Hr.	\$5,504	ECHOS Crew Code COFCQ (Modified)
Unclassified Fill, Delivered, Off-site	402	\$12	C.Y.	\$4,824	ECHOS 02223 1001
Subtotal, Backfill				\$16,000	\$15,592
Site Restoration					
Asphaltic Concrete Pavement, Lots & Driveways, 6" stone base, 2" binder course, 1" topping	2,100	\$2.93	S.F.	\$6,153	Means 32 12 16.14 0020
Hauling, 20 C.Y. dump truck, 20 mile round trip	59	\$14	L.C.Y	\$826	Means 31 23 23.18 1255
Subtotal, Site Restoration				\$7,000	\$6,979
Soil Stabilization					
In-Situ Cement Stabilization, 6%	140	\$32	B.C.Y.	\$4,480	ECHOS 17 03 0602; Assumes one-third of TCE-impacted soil & one-half of the asbestos-impacted soil will require stabilization; Assumes H&S level D.
Subtotal, Soil Stabilization				\$4,500	\$4,480
Transportation/Disposal					
Asphalt	30	\$25	Ton	\$750	SHA discussions with Waste Management, Inc.
VOC-Impacted Soils	612	\$54	Ton	\$33,048	SHA discussions with ESMI; Includes soil stabilization additive.
Asbestos-Impacted Soils, Non-Hazardous	93	\$80	Ton	\$7,440	SHA discussions with Waste Management, Inc.; Includes soil stabilization additive.
Subtotal, Transportation/Disposal				\$41,000	\$41,238
Subtotal, Contractor				\$89,000	\$89,382

TABLE D-2c.2
Detailed Cost Estimate for
Alternative SO-4: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

SO-4: Limited Excavation

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor	55	\$99	Hr.	\$5,445	Assumes 1 week of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$817	L.S.	\$817	Assumes 15% of labor cost
Subtotal, Engineer				\$6,300	\$6,262
Laboratory					
Chemical analysis, Soil Management Assessment Package I	3	\$965	Ea.	\$2,895	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, TCE Confirmatory	5	\$185	Ea.	\$925	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	5	\$50	Ea.	\$250	SHA discussions with EMSL Analytical, Inc.
Subtotal, Laboratory				\$4,100	\$4,070
Subtotal, Limited Excavation				\$100,000	\$99,714
Post-Construction Submittals/As-BUILTS	1	\$5,000	Ea.	\$5,000	SHA estimate
Subtotal, Construction Activities				\$115,000	
<i>Scope Contingency (15% Construction Activities Subtotal)</i>				\$17,000	OSWER 5-6: Assume 15% of O&M Activities Subtotal
<i>Bid Contingency (15% Construction Activities Subtotal)</i>				\$17,000	OSWER 5-6: Assume 15% of O&M Activities Subtotal
Subtotal, Construction Activities with Contingencies				\$150,000	
Professional/Technical Services					
<i>Project Management (8% Construction Activities Subtotal w/Contingencies)</i>				\$12,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
<i>Remedial Design (15% Construction Activities Subtotal w/Contingencies)</i>				\$23,000	OSWER 5-8: Assume 15% of Construction Activities Subtotal including contingencies
<i>Construction Management (10% Construction Activities Subtotal w/Contingencies)</i>				\$15,000	OSWER 5-8: Assume 10% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$ 50,000	
Institutional Controls					
Establish Deed Restrictions					
Engineer					
Establish Institutional Controls in the form of Deed Restrictions	3	\$5,000	Ea.	\$15,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				\$15,000	\$15,000
Subtotal, Establish Deed Restrictions				\$15,000	\$15,000
Subtotal, Institutional Controls				\$15,000	
TOTAL, CAPITAL COSTS				\$220,000	

TABLE D-2c.2
Detailed Cost Estimate for
Alternative SO-4: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

SO-4: Limited Excavation

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
PERIODIC COSTS					
Professional/Technical Services					
Five-Year Review					
<i>Engineer</i>					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
		Subtotal, Engineer		\$13,000	<i>\$13,020</i>
		Subtotal, Five-Year Review		\$13,000	<i>\$13,020</i>
		Subtotal, Professional/Technical Services		\$13,000	
		TOTAL, PERIODIC COSTS		\$13,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sum S.F. = square feet
C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- The following assumptions were used for the quantity estimates:
 - We assumed "swell" factor of 18% for excavated soils.
 - We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
- "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

Appendix D-2d

Cost Estimates for Alternative SO-5

Note that this appendix includes costs which have been updated using those originally presented in the Draft FS (SHA, 2007) for alternative SO-5. Revisions were based on updated volumes of soils requiring remediation under this alternative.

TABLE D-2d.1
Cost Estimate Summary for
Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COSTS

Construction Activities

Implementation Plans/Submittals	\$51,000
EOSS Excavation	
Contractor	
Mobilization/Demobilization	\$4,900
Site Preparation	\$40,000
Excavation	\$36,000
Backfill	\$33,000
Site Restoration	\$190,000
Soil Stabilization	\$65,000
Transportation/Disposal	\$210,000
Subtotal, Contractor	<u>\$580,000</u>
Engineer	\$25,000
Laboratory	\$20,000
Subtotal, EOSS Excavation	<u><u>\$630,000</u></u>
Post-Construction Submittals/As-Built	\$26,000
Subtotal, Construction Activities	\$702,000
Scope Contingency (15% Construction Activities Subtotal)	\$105,000
Bid Contingency (15% Construction Activities Subtotal)	\$105,000
Subtotal, Construction Activities with Contingencies	<u><u>\$912,000</u></u>
Professional/Technical Services	
Project Management (6% Construction Activities Subtotal w/Contingencies)	\$55,000
Remedial Design (12% Construction Activities Subtotal w/Contingencies)	\$109,000
Construction Management (8% Construction Activities Subtotal w/Contingencies)	\$73,000
Subtotal, Professional/Technical Services	<u><u>\$237,000</u></u>
Institutional Controls	
Establish Deed Restrictions	\$15,000
Subtotal, Institutional Controls	<u><u>\$15,000</u></u>

TOTAL, CAPITAL COSTS	<u><u>\$1,200,000</u></u>
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TABLE D-2d.1
Cost Estimate Summary for
Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

ANNUAL O&M COSTS

O&M Activities

Maintain Cap/Cover

Earthwork Contractor (Assume 1 visit annually)

Mobilization/Demobilization

\$690

Repairs to Soil Cover

\$1,600

Pavement Restoration

\$11,200

Subtotal, Earthwork Contractor

\$14,000

Landscaping Contractor (Assume 2 visits annually)

\$500

Engineer

\$7,400

Subtotal, Maintain Cap/Cover

\$21,000

Subtotal, O&M Activities Costs

\$21,000

Scope Contingency (25% O&M Activities Subtotal)

\$5,300

Bid Contingency (15% O&M Activities Subtotal)

\$3,200

Subtotal, O&M Activities with Contingencies

\$30,000

Professional/Technical Services

Project Management (10% O&M Activities Subtotal w/Contingencies)

\$3,000

Technical Support (15% O&M Activities Subtotal w/Contingencies)

\$4,500

Subtotal, Professional/Technical Services

\$7,500

TOTAL, ANNUAL O&M COSTS

\$38,000

PERIODIC COSTS

Professional/Technical Services

Five-Year Review

\$13,000

Subtotal, Professional/Technical Services

\$13,000

TOTAL, PERIODIC COSTS

\$13,000

TABLE D-2d.1
Cost Estimate Summary for
Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos \geq 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$1,200,000	\$1,200,000	1	\$ 1,200,000
Annual O&M Costs	1-100	\$3,800,000	\$38,000	14.3	\$540,000
Periodic Costs	5	\$13,000	\$13,000	0.713	\$9,000
Periodic Costs	10	\$13,000	\$13,000	0.508	\$7,000
Periodic Costs	15	\$13,000	\$13,000	0.362	\$5,000
Periodic Costs	20	\$13,000	\$13,000	0.258	\$3,400
Periodic Costs	25	\$13,000	\$13,000	0.184	\$2,400
Periodic Costs	30	\$13,000	\$13,000	0.131	\$1,700
Periodic Costs	35	\$13,000	\$13,000	0.0937	\$1,200
Periodic Costs	40	\$13,000	\$13,000	0.0668	\$900
Periodic Costs	45	\$13,000	\$13,000	0.0476	\$600
Periodic Costs	50	\$13,000	\$13,000	0.0339	\$400
Periodic Costs	55	\$13,000	\$13,000	0.0242	\$310
Periodic Costs	60	\$13,000	\$13,000	0.0173	\$220
Periodic Costs	65	\$13,000	\$13,000	0.0123	\$160
Periodic Costs	70	\$13,000	\$13,000	0.00877	\$110
Periodic Costs	75	\$13,000	\$13,000	0.00625	\$80
Periodic Costs	80	\$13,000	\$13,000	0.00446	\$60
Periodic Costs	85	\$13,000	\$13,000	0.00318	\$40
Periodic Costs	90	\$13,000	\$13,000	0.00227	\$30
Periodic Costs	95	\$13,000	\$13,000	0.00162	\$21
Periodic Costs	100	\$13,000	\$13,000	0.00115	\$15

TOTAL PRESENT VALUE OF ALTERNATIVE

\$1,800,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-2d.2
Detailed Cost Estimate for
Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 02
Date: April 2008

SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS					
Construction Activities					
Implementation Plans/Submittals	1	\$51,000	Ea.	\$51,000	SHA estimate
EOSS Excavation					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader, Compactor, 70 to 150 HP	4	\$417	Ea.	\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Loader, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.
Subtotal, Mobilization/Demobilization				\$4,900	\$4,898
Site Preparation					
Pavement removal, Bituminous driveways	5,802	\$5.72	S.Y.	\$33,187	Means 02 41 13.17 5100
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	1,500	\$4.28	L.F.	\$6,420	ECHOS 18 05 0206
Subtotal, Site Preparation				\$40,000	\$39,607
Excavation					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	56	\$215	Hr.	\$12,040	ECHOS 17 03 0231; Assumes H&S level D.
926, 2.0 CY, Wheel Loader	56	\$144	Hr.	\$8,064	ECHOS 17 03 0222; Assumes H&S level D.
Bobcat	56	\$126	Hr.	\$7,056	ECHOS Crew Code COBBC; Assumes H&S level D.
Water Truck	56	\$103	Hr.	\$5,768	ECHOS Crew Code COKBM (Modified); Assumes H&S level D.
Sprayed Water Dust Suppressant	68,700	\$0.05	S	\$3,435	ECHOS 33 08 0585; Assumes H&S level D.
Subtotal, Excavation				\$36,000	\$36,363
Backfill					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	24	\$199	Hr.	\$4,776	ECHOS 17 03 0231
926, 2.0 CY, Wheel Loader	24	\$130	Hr.	\$3,120	ECHOS 17 03 0222
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	24	\$344	Hr.	\$8,256	ECHOS Crew Code COFCQ (Modified)
Unclassified Fill, Delivered, Off-site	1388	\$12	C.Y.	\$16,656	ECHOS 02223 1001
Subtotal, Backfill				\$33,000	\$32,808
Site Restoration					
Asphaltic Concrete Pavement, Lots & Driveways, 6" stone base, 2" binder course, 1" topping	52,218	\$2.93	S.F.	\$152,999	Means 32 12 16.14 0020
Hauling, 20 C.Y. dump truck, 20 mile round trip	1,451	\$14	L.C.Y	\$20,314	Means 31 23 23.18 1255
Topsoil, Furnish & Place, 6" Lifts, Off-site	305	\$55	C.Y.	\$16,775	ECHOS 18 05 0301
Mechanical Seeding, Grass seed hand push spreader	15	\$27	M.S.F.	\$405	Means 32 92 19.13 0800
Subtotal, Subcontractor				\$190,000	\$190,493
Soil Stabilization					
Cement Stabilization, 6%	2,030	\$32	B.C.Y.	\$64,960	ECHOS 17 03 0602; Assumes ~1/4 of TCE-impacted soil, 1/2 of the asbestos-impacted soil, & 3/4 of the PAH/As-impacted soil will require stabilization; Assumes H&S level D.
Subtotal, Soil Stabilization				\$65,000	\$64,960

TABLE D-2d.2
Detailed Cost Estimate for
Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 02
Date: April 2008

SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Transportation/Disposal					
Asphalt	725	\$25	Ton	\$18,129	SHA discussions with Waste Management, Inc.
VOC-Impacted Soils, Non-Hazardous	600	\$54	Ton	\$32,400	SHA discussions with ESMI; Includes soil stabilization additive.
Asbestos-Impacted Soils, Non-Hazardous	90	\$80	Ton	\$7,200	SHA discussions with Waste Management, Inc.; Includes soil stabilization additive.
Non-Asbestos Impacted Soils, Non-Hazardous	4,050	\$38	Ton	\$153,900	SHA discussions with Waste Management, Inc.; Includes soil stabilization additive.
Subtotal, Transportation/Disposal				\$210,000	\$211,629
Subtotal, Contractor				\$580,000	\$580,758
Engineer					
Labor	220	\$99	hr	\$21,780	Assumes 4 weeks of field work
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$3,267	l.s.	\$3,267	Assumes 15% of labor cost
Subtotal, Engineer				\$25,000	\$25,047
Laboratory					
Chemical analysis, Soil Management Assessment Package I	10	\$965	Ea.	\$9,650	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, TCE Confirmatory	5	\$185	Ea.	\$925	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	5	\$50	Ea.	\$250	SHA discussions with EMSL Analytical, Inc.
Chemical analysis, PAHs Confirmatory	56	\$155	Ea.	\$8,680	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 1 sample collected every 50 feet of lateral excavation extents
Chemical analysis, As Confirmatory	3	\$13	Ea.	\$39	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Subtotal, Laboratory				\$20,000	\$19,544
Subtotal, EOSS Excavation				\$630,000	\$625,349
Post-Construction Submittals/As-Built	1	\$26,000	Ea.	\$26,000	SHA estimate
Subtotal, Construction Activities				\$702,000	
Scope Contingency (15% Construction Activities Subtotal)				\$105,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Bid Contingency (15% Construction Activities Subtotal)				\$105,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities with Contingencies				\$912,000	
Professional/Technical Services					
Project Management (6% Construction Activities Subtotal w/Contingencies)				\$55,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
Remedial Design (12% Construction Activities Subtotal w/Contingencies)				\$109,000	OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies
Construction Management (8% Construction Activities Subtotal w/Contingencies)				\$73,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$237,000	
Institutional Controls					
Establish Deed Restrictions					
Engineer					
Establish Institutional Controls in the form of Deed Restrictions	3	\$5,000	Ea.	\$15,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				\$15,000	\$15,000
Subtotal, Establish Deed Restrictions				\$15,000	\$15,000
Subtotal, Institutional Controls				\$15,000	
TOTAL, CAPITAL COSTS				\$1,200,000	

TABLE D-2d.2
Detailed Cost Estimate for
Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 02
Date: April 2008

SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT	COSTS	UNITS	COST	COMMENTS/REFERENCE
ANNUAL O&M COSTS						
O&M Activities						
Maintain Cap/Cover						
<i>Earthwork Contractor (Assume 1 visit annually)</i>						
Mobilization/Demobilization						
Crew, 100 miles, per person	2		\$192	Ea.	\$384	ECHOS 33 01 0204
Small Equipment	1		\$104	Ea.	\$104	Means 01 54 36.50 1100; assumes 50 miles per mob/demob
Decontaminate Light Equipment	1		\$200	Ea.	\$200	ECHOS 33 17 0801
Subtotal, Mobilization/Demobilization					\$690	\$688
Repairs to Soil Cover						
Bobcat	8		\$126	Hr.	\$1,008	ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	10		\$55	C.Y.	\$550	ECHOS 08 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	0.8		\$27	M.S.F.	\$22	Means 32 92 19.13 0800
Subtotal, Repairs to Soil Cover					\$1,600	\$1,580
Pavement Restoration						
Pavement removal, Bituminous driveways	291		\$5.71	S.Y.	\$1,662	Means 02 41 13.17 5100; Assumes 5% of paved area is replaced annually.
Transportation & Disposal, Asphalt	36		\$25	Ton	\$906	SHA discussions with Waste Management, Inc.
Asphaltic Concrete Pavement, Lots & Driveways, 6	2,611		\$2.93	S.F.	\$7,650	Means 32 12 16.14 0020; Assumes 5% of paved area is replaced annually.
Hauling, 20 C.Y. dump truck, 20 mile round trip	73		\$14	L.C.Y	\$1,015	Means 31 23 23.18 1255
Subtotal, Pavement Restoration					\$11,200	\$11,234
Subtotal, Earthwork Contractor					\$14,000	\$13,501
<i>Landscaping Contractor (Assume 2 visits annually)</i>						
Mowing, 1st event	1		\$250.00	M.S.F.	\$250	SHA estimate.
Mowing, 2nd event	1		\$250.00	M.S.F.	\$250	SHA estimate.
Subtotal, Landscaping Contractor					\$500	\$500
<i>Engineer</i>						
Labor, Quarterly Inspections	4		\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate of \$99/hr. See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1		\$594	L.S.	\$594	Assume 15% of field labor cost.
Labor, Annual Summary Report Preparation	22		\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1		\$137	L.S.	\$137	Assume 5% of report preparation labor cost.
Subtotal, Engineer					\$7,400	\$7,419
Subtotal, Maintain Cap/Cover					\$21,000	\$21,420
Subtotal, O&M Activities Costs					\$21,000	
<i>Scope Contingency (25% O&M Activities Subtotal)</i>					\$5,300	OSWER 5-6: Assume 25% of O&M Activities Subtotal
<i>Bid Contingency (15% O&M Activities Subtotal)</i>					\$3,200	OSWER 5-6: Assume 15% of O&M Activities Subtotal
Subtotal, O&M Activities with Contingencies					\$30,000	
Professional/Technical Services						
<i>Project Management (10% O&M Activities Subtotal w/Contingencies)</i>					\$3,000	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
<i>Technical Support (15% O&M Activities Subtotal w/Contingencies)</i>					\$4,500	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Subtotal, Professional/Technical Services					\$7,500	
TOTAL, ANNUAL O&M COSTS					\$38,000	

TABLE D-2d.2
Detailed Cost Estimate for
Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 02
Date: April 2008

SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
PERIODIC COSTS					
Professional/Technical Services					
Five-Year Review					
Engineer					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
Subtotal, Engineer				\$13,000	\$13,020
Subtotal, Five-Year Review				\$13,000	\$13,020
Subtotal, Professional/Technical Services				\$13,000	
TOTAL, PERIODIC COSTS				\$13,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sum S.F. = square feet
C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- The following assumptions were used for the quantity estimates:
 - We assumed "swell" factor of 18% for excavated soils.
 - We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
- "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

Appendix D-2e

Cost Estimates for Alternative SO-6

Note that this appendix includes costs which have been developed using those originally presented in the Draft FS (SHA, 2007) for alternative SO-5. Updates were based on volumes of soils requiring remediation under this alternative.

TABLE D-2e.1
Cost Estimate Summary for
Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COSTS

Construction Activities

Implementation Plans/Submittals	\$51,000
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EOSS Excavation

Contractor

Mobilization/Demobilization	\$9,900
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Site Preparation	\$45,000
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Excavation	\$74,000
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Backfill	\$145 ,000
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Site Restoration	\$207,000
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Soil Stabilization	\$90,000
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Transportation/Disposal	\$501,000
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Subtotal, Contractor	\$1,070 ,000
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Engineer	\$37,000
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Laboratory	\$33,000
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Subtotal, EOSS Excavation	\$1,140 ,000
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Post-Construction Submittals/As-Builts	\$26,000
--	----------

Subtotal, Construction Activities	\$1,217 ,000
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Scope Contingency (15% Construction Activities Subtotal)	\$183,000
--	-----------

Bid Contingency (15% Construction Activities Subtotal)	\$183,000
--	-----------

Subtotal, Construction Activities with Contingencies	\$1,583,000
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Professional/Technical Services

Project Management (6% Construction Activities Subtotal w/Contingencies)	\$95,000
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Remedial Design (12% Construction Activities Subtotal w/Contingencies)	\$190,000
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Construction Management (8% Construction Activities Subtotal w/Contingencies)	\$127,000
---	-----------

Subtotal, Professional/Technical Services	\$412,000
--	------------------

Institutional Controls

Establish Deed Restrictions	\$15,000
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Subtotal, Institutional Controls	\$15,000
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TOTAL, CAPITAL COSTS	\$2,010,000
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TABLE D-2e.1
Cost Estimate Summary for
Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

ANNUAL O&M COSTS

O&M Activities

None

PERIODIC COSTS

Professional/Technical Services

Five-Year Review

\$13,000

Subtotal, Professional/Technical Services

\$13,000

TOTAL, PERIODIC COSTS

\$13,000

TABLE D-2e.1
Cost Estimate Summary for
Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$2,010,000	\$2,010,000	1	\$2,010,000
Periodic Costs	5	\$13,000	\$13,000	0.713	\$9,000
Periodic Costs	10	\$13,000	\$13,000	0.508	\$7,000
Periodic Costs	15	\$13,000	\$13,000	0.362	\$5,000
Periodic Costs	20	\$13,000	\$13,000	0.258	\$3,400
Periodic Costs	25	\$13,000	\$13,000	0.184	\$2,400
Periodic Costs	30	\$13,000	\$13,000	0.131	\$1,700
Periodic Costs	35	\$13,000	\$13,000	0.0937	\$1,200
Periodic Costs	40	\$13,000	\$13,000	0.0668	\$900
Periodic Costs	45	\$13,000	\$13,000	0.0476	\$600
Periodic Costs	50	\$13,000	\$13,000	0.0339	\$400
Periodic Costs	55	\$13,000	\$13,000	0.0242	\$310
Periodic Costs	60	\$13,000	\$13,000	0.0173	\$220
Periodic Costs	65	\$13,000	\$13,000	0.0123	\$160
Periodic Costs	70	\$13,000	\$13,000	0.00877	\$110
Periodic Costs	75	\$13,000	\$13,000	0.00625	\$80
Periodic Costs	80	\$13,000	\$13,000	0.00446	\$60
Periodic Costs	85	\$13,000	\$13,000	0.00318	\$40
Periodic Costs	90	\$13,000	\$13,000	0.00227	\$30
Periodic Costs	95	\$13,000	\$13,000	0.00162	\$21
Periodic Costs	100	\$13,000	\$13,000	0.00115	\$15

TOTAL PRESENT VALUE OF ALTERNATIVE

\$2,040,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-2e.2
Detailed Cost Estimate for
Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

SO-6: Excavation and Off-Site Disposal (Comprehensive)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS					
Construction Activities					
Implementation Plans/Submittals	1	\$51,000 Ea.		\$51,000	SHA estimate
EOSS Excavation					
<i>Contractor</i>					
Mobilization/Demobilization					
Mob/Demob, General Equipment and Facilities	1	\$5,000 Ea.		\$5,000	Assumed allowance
Mob/Demob, Loader, Compactor, 70 to 150 HP	4	\$417 Ea.		\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Loader, Above 150 HP	2	\$613 Ea.		\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104 Ea.		\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decontaminate Light Equipment	1	\$200 Ea.		\$200	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399 Ea.		\$1,596	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.
Subtotal, Mobilization/Demobilization				\$9,900	\$9,898
Site Preparation					
Utility Locating	1	\$2,000 Ea.		\$2,000	Assumed 1-day allowance
Pavement removal, Bituminous driveways	6346	\$5.72 S.Y.		\$36,299	Means 02 41 13.17 5100
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	1500	\$4.28 L.F.		\$6,420	ECHOS 18 05 0206
Subtotal, Site Preparation				\$45,000	\$44,719
Excavation					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	120	\$215 Hr.		\$25,800	ECHOS 17 03 0231; Assumes H&S level D.
926, 2.0 CY, Wheel Loader	120	\$144 Hr.		\$17,280	ECHOS 17 03 0222; Assumes H&S level D.
Bobcat	120	\$126 Hr.		\$15,120	ECHOS Crew Code COBBC; Assumes H&S level D.
Water Truck	120	\$103 Hr.		\$12,360	ECHOS Crew Code COKBM (Modified); Assumes H&S level D.
Sprayed Water Dust Suppressant	73600	\$0.05 S.F.		\$3,680	ECHOS 33 08 0585; Assumes H&S level D.
Subtotal, Excavation				\$74,000	\$74,240
Backfill					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	80	\$199 Hr.		\$15,920	ECHOS 17 03 0231
926, 2.0 CY, Wheel Loader	80	\$130 Hr.		\$10,400	ECHOS 17 03 0222
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	80	\$344 Hr.		\$27,520	ECHOS Crew Code COFCQ (Modified)
Unclassified Fill, Delivered, Off-site	7570	\$12 C.Y.		\$90,835	ECHOS 02223 1001; Assume 1.2 factor times volume removed
Subtotal, Backfill				\$145,000	\$144,675
Site Restoration					
Asphaltic Concrete Pavement, Lots & Driveways, 6" stone base, 2" binder course, 1" topping	57118	\$2.93 S.F.		\$167,356	Means 32 12 16.14 0020
Hauling, 20 C.Y. dump truck, 20 mile round trip	1587	\$14 C.Y.		\$22,218	Means 31 23 23.18 1255
Topsoil, Furnish & Place, 6" Lifts, Off-site	305	\$55 C.Y.		\$16,775	ECHOS 18 05 0301
Mechanical Seeding, Grass seed hand push spreader	15	\$27 M.S.F.		\$405	Means 32 92 19.13 0800
Subtotal, Subcontractor				\$207,000	\$206,754
Soil Stabilization					
Cement Stabilization, 6%	2800	\$32 B.C.Y.		\$89,600	ECHOS 17 03 0602; Assumes 1/4 of TCE-impacted soil, 1/2 of the asbestos-impacted soil, & 3/4 of the PAH/As-impacted soil will require stabilization; Assumes H&S level D
Subtotal, Soil Stabilization				\$90,000	\$89,600

TABLE D-2e.2
Detailed Cost Estimate for
Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

SO-6: Excavation and Off-Site Disposal (Comprehensive)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Transportation/Disposal					
Asphalt	793	\$25	Ton	\$19,825	SHA discussions with Waste Management, Inc.
VOC-Impacted Soils, Non-Hazardous	600	\$54	Ton	\$32,400	SHA discussions with ESMI; Includes soil stabilization additive.
Asbestos-Impacted Soils, Non-Hazardous	90	\$80	Ton	\$7,200	SHA discussions with Waste Management, Inc.; Includes soil stabilization additive.
Non-Asbestos Impacted Soils, Non-Hazardous	11610	\$38	Ton	\$441,180	SHA discussions with Waste Management, Inc.; Includes soil stabilization additive.
Subtotal, Transportation/Disposal				\$501,000	\$500,605
Subtotal, Contractor				\$1,070,000	\$1,070,491
Engineer					
Labor	240	\$99	hr	\$23,760	Assumes 6 weeks of field work
Misc. Field Expenses (e.g., mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$3,564	L.F.	\$3,564	Assumes 15% of labor cost
Air/dust Monitoring	10	\$1,000	day	\$10,000	Assumed allowance
Subtotal, Engineer				\$37,000	\$37,324
Laboratory					
Chemical analysis, Soil Management Assessment Package I	22	\$965	Ea.	\$21,230	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 15 for soils leaving site and 7 for backfill soils
Chemical analysis, TCE Confirmatory	5	\$185	Ea.	\$925	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	5	\$50	Ea.	\$250	SHA discussions with EMSL Analytical, Inc.
Chemical analysis, PAHs Confirmatory	66	\$155	Ea.	\$10,230	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 1 sample collected every 50 feet of lateral excavation extents; plus 10 for deeper excavations
Chemical analysis, As Confirmatory	3	\$13	Ea.	\$39	Assumes 15% of labor cost
Subtotal, Laboratory				\$33,000	\$32,674
Subtotal, EOSS Excavation				\$1,140,000	\$1,140,489
Post-Construction Submittals/As-Builts	1	\$26,000	Ea.	\$26,000	SHA estimate
Subtotal, Construction Activities				\$1,217,000	
Scope Contingency (15% Construction Activities Subtotal)				\$183,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Bid Contingency (15% Construction Activities Subtotal)				\$183,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities with Contingencies				\$1,583,000	
Professional/Technical Services					
Project Management (6% Construction Activities Subtotal w/Contingencies)				\$95,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
Remedial Design (12% Construction Activities Subtotal w/Contingencies)				\$190,000	OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies
Construction Management (8% Construction Activities Subtotal w/Contingencies)				\$127,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$412,000	
Institutional Controls					
Establish Deed Restrictions					
Engineer					
Establish Institutional Controls in the form of Deed Restrictions	3	\$5,000	Ea.	\$15,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				\$15,000	\$15,000
Subtotal, Establish Deed Restrictions				\$15,000	\$15,000
Subtotal, Institutional Controls				\$15,000	
TOTAL, CAPITAL COSTS				\$2,010,000	

TABLE D-2e.2
Detailed Cost Estimate for
Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

SO-6: Excavation and Off-Site Disposal (Comprehensive)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
PERIODIC COSTS					
Professional/Technical Services					
Five-Year Review					
Engineer					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
Subtotal, Engineer				\$13,000	\$13,020
Subtotal, Five-Year Review				\$13,000	\$13,020
Subtotal, Professional/Technical Services				\$13,000	
TOTAL, PERIODIC COSTS				\$13,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sum S.F. = square feet
C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- The following assumptions were used for the quantity estimates:
 - We assumed "swell" factor of 18% for excavated soils.
 - We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
- "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.
- Assume no utility lines need to be cut/removed/replaced.
- Assume backfill can be placed immediately following excavation to required depths.
- Excavated soil will be loaded directly into vehicles for off-site disposal.

APPENDIX D-3

AOC ALTERNATIVE COST ESTIMATES

Appendix D-3a

Cost Estimates for Alternative AOC-2

TABLE D-3a.1
Cost Estimate Summary for
Alternative AOC-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT

Date: October 2007

CAPITAL COSTS

Institutional Controls

Establish Deed Restrictions

\$15,000

Subtotal, Institutional Controls

\$15,000

TOTAL CAPITAL COSTS

\$15,000

ANNUAL O&M COSTS

O&M Activities

Maintain AOC Cap

Earthwork Contractor (Assume 1 visit annually)

Mobilization/Demobilization

\$940

Repairs to Soil Cap

\$1,600

Pavement Restoration

\$3,900

Subtotal, Earthwork Contractor

\$6,400

Landscaping Contractor (Assume 2 visits annually)

\$560

Engineer

\$7,400

Subtotal, Maintain AOC Cap

\$14,000

Subtotal, O&M Activities

\$14,000

Scope Contingency (15% Annual O&M Subtotal)

\$2,100

Bid Contingency (15% Annual O&M Subtotal)

\$2,100

Subtotal, O&M Activities w/Contingencies

\$18,000

Professional/Technical Services

Project Management (10% Annual O&M Subtotal w/Contingencies)

\$1,800

Technical Support (15% Annual O&M Subtotal w/Contingencies)

\$2,700

Subtotal, Professional/Technical Services

\$4,500

TOTAL ANNUAL O&M COSTS

\$23,000

TABLE D-3a.1
Cost Estimate Summary for
Alternative AOC-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT

Date: October 2007

PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities	
Maintain Security Fence (every 5 years)	\$8,200

Subtotal, Every 5 Years O&M Activities	\$8,200
Scope Contingency (15% Every 5 Years O&M Subtotal)	\$1,200
Bid Contingency (15% Every 5 Years O&M Subtotal)	\$1,200
Subtotal, Every 5 Years O&M Activities w/Contingencies	\$11,000

Subtotal, Construction/O&M Activities	\$11,000
--	-----------------

Professional/Technical Services

Project Management (10% Periodic Construction/O&M Activities Subtotal)	\$1,100
Technical Support (15% Periodic Construction/O&M Activities Subtotal)	\$1,650
Five-Year Review	\$13,000

Subtotal, Professional/Technical Services	\$16,000
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TOTAL PERIODIC COSTS

\$27,000

PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$15,000	\$15,000	1	\$15,000
Annual O&M Costs	1-100	\$2,300,000	\$23,000	14.3	\$330,000
Periodic Costs	5	\$27,000	\$27,000	0.713	\$19,000
Periodic Costs	10	\$27,000	\$27,000	0.508	\$14,000
Periodic Costs	15	\$27,000	\$27,000	0.362	\$9,800
Periodic Costs	20	\$27,000	\$27,000	0.258	\$7,000
Periodic Costs	25	\$27,000	\$27,000	0.184	\$5,000
Periodic Costs	30	\$27,000	\$27,000	0.131	\$3,500
Periodic Costs	35	\$27,000	\$27,000	0.0937	\$2,500
Periodic Costs	40	\$27,000	\$27,000	0.0668	\$1,800
Periodic Costs	45	\$27,000	\$27,000	0.0476	\$1,300
Periodic Costs	50	\$27,000	\$27,000	0.0339	\$920
Periodic Costs	55	\$27,000	\$27,000	0.0242	\$650
Periodic Costs	60	\$27,000	\$27,000	0.0173	\$470
Periodic Costs	65	\$27,000	\$27,000	0.0123	\$330
Periodic Costs	70	\$27,000	\$27,000	0.00877	\$240
Periodic Costs	75	\$27,000	\$27,000	0.00625	\$170
Periodic Costs	80	\$27,000	\$27,000	0.00446	\$120
Periodic Costs	85	\$27,000	\$27,000	0.00318	\$86
Periodic Costs	90	\$27,000	\$27,000	0.00227	\$61
Periodic Costs	95	\$27,000	\$27,000	0.00162	\$44
Periodic Costs	100	\$27,000	\$27,000	0.00115	\$31

TOTAL PRESENT VALUE OF ALTERNATIVE

\$412,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

Revision No.: 01 - DRAFT
Date: October 2007

TABLE D-3a.2
Detailed Cost Estimate for
Alternative AOC-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

AOC-2: Limited Action

DESCRIPTION	UNIT			COST	COMMENTS/REFERENCE
	QTY	COSTS	UNITS		
	Subtotal, O&M Activities			\$14,000	
<i>Scope Contingency (15% Annual O&M Subtotal)</i>				\$2,100	OSWER 5-6: Assume 15% of O&M Subtotal
<i>Bid Contingency (15% Annual O&M Subtotal)</i>				\$2,100	OSWER 5-6: Assume 15% of O&M Subtotal
Subtotal, O&M Activities w/Contingencies				\$18,000	
Professional/Technical Services					
<i>Project Management (10% Annual O&M Subtotal w/Contingencies)</i>				\$1,800	OSWER 5-8: Assume 10% of Annual O&M Subtotal including contingencies
<i>Technical Support (15% Annual O&M Subtotal w/Contingencies)</i>				\$2,700	OSWER 5-8: Assume 15% of Annual O&M Subtotal including contingencies
Subtotal, Professional/Technical Services				\$4,500	
TOTAL ANNUAL O&M COSTS				\$23,000	

PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities

Maintain Security Fence (every 5 years)

Earthwork Contractor

Security Fence

Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	228	\$36	L.F.	\$8,208	Means 32 31 13.20 0500; Assumes 10% of security fence is repaired every 5 years.
Subtotal, Earthwork Contractor				\$8,200	\$8,208
Subtotal, Maintain Security Fence (every 5 years)				\$8,200	\$8,208
Subtotal, Every 5 Years O&M Activities				\$8,200	
<i>Scope Contingency (15% Every 5 Years O&M Subtotal)</i>				\$1,200	OSWER 5-6: Assume 15% of Periodic Maintenance Costs Subtotal
<i>Bid Contingency (15% Every 5 Years O&M Subtotal)</i>				\$1,200	OSWER 5-6: Assume 15% of Periodic Maintenance Costs Subtotal
Subtotal, Every 5 Years O&M Activities w/Contingencies				\$11,000	
Subtotal, Construction/O&M Activities				\$11,000	

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Date: October 2007

S:\CONDATA\2000s\2032.01\Work\Detailed Analysis Work\Cost Estimates\FS Cost Tables\AOC RA Cost Estimates\AOC Cost Summaries.xls Page 3 of 3

Appendix D-3b

Cost Estimates for Alternative AOC-3

Cost Estimate Summary for

Date: October 2007

**Alternative AOC-3: Maintain Existing Soil Cap on AOC,
Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts**

CAPITAL COSTS**Construction Activities**

Implementation Plans/Submittals	\$24,000
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Settling Basing #2 Excavation

Contractor

Mobilization/Demobilization	\$3,300
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Site Preparation	\$1,300
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Excavation	\$27,000
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Backfill	\$11,000
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Site Restoration	\$2,500
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Transportation/Disposal	\$180,000
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Subtotal, Contractor	\$230,000
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Engineer	\$13,000
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Laboratory	\$4,800
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Subtotal, Settling Basin #2 Excavation	\$240,000
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Post-Construction Submittals/As-Builts	\$12,000
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Subtotal, Construction Activities	\$276,000
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Scope Contingency (15% Construction Activities Subtotal)	\$40,000
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Bid Contingency (15% Construction Activities Subtotal)	\$41,000
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Subtotal, Construction Activities w/Contingencies	\$360,000
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Professional/Technical Services

Remedial Design (15% Construction Activities Subtotal w/Contingencies)	\$54,000
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Project management (8% Construction Activities Subtotal w/Contingencies)	\$29,000
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Construction Management (10% Construction Activities Subtotal w/Contingencies)	\$36,000
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Subtotal, Professional/Technical Services	\$120,000
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Institutional Controls

Establish Deed Restrictions	\$15,000
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Subtotal, Institutional Controls	\$15,000
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TOTAL CAPITAL COSTS

\$500,000

Cost Estimate Summary for

Date: October 2007

**Alternative AOC-3: Maintain Existing Soil Cap on AOC,
Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts**

ANNUAL O&M COSTS**O&M Activities**

Maintain AOC Cap

Earthwork Contractor (Assume 1 visit annually)

Mobilization/Demobilization \$940

Repairs to Soil Cap \$1,600

Pavement Restoration \$3,900

Subtotal, Earthwork Contractor \$6,400

Landscaping Contractor (Assume 2 visits annually) \$560

Engineer \$7,400

Subtotal, Maintain AOC Cap \$14,000

Subtotal, O&M Activities \$14,000

Scope Contingency (15% O&M Subtotal) \$2,100

Bid Contingency (15% O&M Subtotal) \$2,100

Subtotal, O&M Activities w/Contingencies \$18,000**Professional/Technical Services**

Project Management (10% O&M Subtotal w/Contingencies) \$1,800

Technical Support (15% O&M Subtotal w/Contingencies) \$2,700

Subtotal, Professional/Technical Services \$4,500**TOTAL ANNUAL O&M COST****\$23,000****PERIODIC COSTS****Construction/O&M Activities**

Every 5 Years O&M Activities

Maintain Security Fence (every 5 years) \$8,200

Subtotal, Every 5 Years O&M Activities \$8,200

Scope Contingency (15% Every 5 Years O&M Activities Subtotal) \$1,200

Bid Contingency (15% Every 5 Years O&M Activities Subtotal) \$1,200

Subtotal, Every 5 Years O&M Activities w/Contingencies \$11,000

Subtotal, Construction/O&M Activities \$11,000**Professional/Technical Services**

Project Management (10% Construction/O&M Activities Subtotal w/Contingencies) \$1,100

Technical Support (15% Construction/O&M Activities Subtotal w/Contingencies) \$1,700

Five-Year Review \$13,000

Subtotal, Professional/Technical Services \$16,000**TOTAL PERIODIC COSTS****\$27,000**

TABLE D-3b.1
Cost Estimate Summary for
Alternative AOC-3: Maintain Existing Soil Cap on AOC,
Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT

Date: October 2007

PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$500,000	\$500,000	1	\$500,000
Annual O&M Costs	1-100	\$2,300,000	\$23,000	14.3	\$330,000
Periodic Costs	5	\$27,000	\$27,000	0.713	\$19,000
Periodic Costs	10	\$27,000	\$27,000	0.508	\$14,000
Periodic Costs	15	\$27,000	\$27,000	0.362	\$9,800
Periodic Costs	20	\$27,000	\$27,000	0.258	\$7,000
Periodic Costs	25	\$27,000	\$27,000	0.184	\$5,000
Periodic Costs	30	\$27,000	\$27,000	0.131	\$3,500
Periodic Costs	35	\$27,000	\$27,000	0.0937	\$2,500
Periodic Costs	40	\$27,000	\$27,000	0.0668	\$1,800
Periodic Costs	45	\$27,000	\$27,000	0.0476	\$1,300
Periodic Costs	50	\$27,000	\$27,000	0.0339	\$920
Periodic Costs	55	\$27,000	\$27,000	0.0242	\$650
Periodic Costs	60	\$27,000	\$27,000	0.0173	\$470
Periodic Costs	65	\$27,000	\$27,000	0.0123	\$330
Periodic Costs	70	\$27,000	\$27,000	0.00877	\$240
Periodic Costs	75	\$27,000	\$27,000	0.00625	\$170
Periodic Costs	80	\$27,000	\$27,000	0.00446	\$120
Periodic Costs	85	\$27,000	\$27,000	0.00318	\$86
Periodic Costs	90	\$27,000	\$27,000	0.00227	\$61
Periodic Costs	95	\$27,000	\$27,000	0.00162	\$44
Periodic Costs	100	\$27,000	\$27,000	0.00115	\$31

TOTAL PRESENT VALUE OF ALTERNATIVE

\$900,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-3b.2
Detailed Cost Estimate for
Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COST ELEMENTS					
Construction Activities					

Implementation Plans/Submittals	1	\$24,000	Ea.	\$24,000	SHA estimate.
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Settling Basing #2 Excavation

Contractor

Mobilization/Demobilization					
Compactor, 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; assumes 50 miles per mob/demob
Excavator Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; assumes 50 miles per mob/demob
Decontaminate Medium Equipment	3	\$399	Ea.	\$1,197	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.
Subtotal, Mobilization/Demobilization				\$3,300	\$3,257

Site Preparation

Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	300	\$4.28	L.F.	\$1,284	ECHOS 18 05 0206
Subtotal, Site Preparation				\$1,300	\$1,284

Excavation

Crawler-mounted, 2.0 C.Y. 235 Hydraulic Excavator	48	\$409	Hr.	\$19,632	ECHOS 17 03 0232; Assumes H&S level C.
Water Truck	48	\$146	Hr.	\$7,008	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	14,000	\$0.06	S.F.	\$840	ECHOS 33 08 0585; Assumes H&S level C.
Subtotal, Excavation				\$27,000	\$27,480

Backfill

Crawler-mounted, 2.0 C.Y. 235 Hydraulic Excavator	16	\$282	Hr.	\$4,512	ECHOS 17 03 0232
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	16	\$344	Hr.	\$5,504	ECHOS Crew Code COFCQ (Modified)
Compact Backfill, by Machine, Sheepsfoot Roller, 6" Lift	500	\$1.31	C.Y.	\$655	ECHOS 17 03 0514
Subtotal, Backfill				\$11,000	\$10,671

Site Restoration

Seeding, Vegetative Cover	0.33	\$7,632	Acre	\$2,519	ECHOS 18 05 0402
Subtotal, Site-Restoration				\$2,500	\$2,519

Transportation/Disposal

Asbestos-Impacted Soils, Non-Hazardous	2,250	\$80	Ton	\$180,000	SHA discussions with Waste Management, Inc.; Includes stabilization additive.
Subtotal, Transportation/Disposal				\$180,000	\$180,000
Subtotal, Contractor				\$230,000	\$225,211

Engineer

Labor, Oversight	110	\$99	Hr.	\$10,890	Assumes 2 weeks of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$1,634	L.S.	\$1,634	Assumes 15% of oversight labor cost.
Subtotal, Engineer				\$13,000	\$12,524

TABLE D-3b.2
Detailed Cost Estimate for
Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
UNIT					
<i>Laboratory</i>					
Chemical analysis, Soil Management Assessment	5	\$965	Ea.	\$4,825	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Subtotal, Laboratory				\$4,800	\$4,825
Subtotal, Settling Basin #2 Excavation				\$240,000	\$242,560
Post-Construction Submittals/As-Builts	1	\$12,000	Ea.	\$12,000	SHA estimate
Subtotal, Construction Activities				\$276,000	
<i>Scope Contingency (15% Construction Activities Subtotal)</i>				\$40,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
<i>Bid Contingency (15% Construction Activities Subtotal)</i>				\$41,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities w/Contingencies				\$360,000	
Professional/Technical Services					
<i>Remedial Design (15% Construction Activities Subtotal w/Contingencies)</i>				\$54,000	OSWER 5-8: Assume 15% of Construction Activities Subtotal (including contingencies)
<i>Project management (8% Construction Activities Subtotal w/Contingencies)</i>				\$29,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal (including contingencies)
<i>Construction Management (10% Construction Activities Subtotal w/Contingencies)</i>				\$36,000	OSWER 5-8: Assume 10% of Construction Activities Subtotal (including contingencies)
Subtotal, Professional/Technical Services				\$120,000	
Institutional Controls					
Establish Deed Restrictions					
<i>Engineer</i>					
Establish Institutional Controls in the form of Deed Restrictions	3	\$5,000	Ea.	\$15,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				\$15,000	
Subtotal, Establish Deed Restrictions				\$15,000	
Subtotal, Institutional Controls				\$15,000	
TOTAL CAPITAL COSTS				\$500,000	

ANNUAL O&M COST ELEMENTS

O&M Activities

Maintain AOC Cap

Earthwork Contractor (Assume 1 visit annually)

Mobilization/Demobilization					
Equipment, Truck 2 Axle, Highway, 33,000 GVW, 6x2,2	1	\$452	Day	\$452	ECHOS 33 01 0111
Crew, 100 miles, per person	2	\$192	Ea.	\$384	ECHOS 33 01 0204
Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Subtotal, Mobilization/Demobilization				\$940	\$940
Repairs to Soil Cap					
Bobcat	8	\$126	Hr.	\$1,008	ECHOS Crew Code COBBC; Assumes H&S level D.
Topsoil, Furnish & Place, 6" Lifts, Off-site	10	\$55	C.Y.	\$550	ECHOS 08 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	1	\$27	M.S.F.	\$27	Means 32 92 19.13 0800; Assumes 5% of soil capped AOC is re-seeded annually.
Subtotal, Repairs to Soil Cap				\$1,600	\$1,558

TABLE D-3b.2
Detailed Cost Estimate for
Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Pavement Restoration					
Pavement Removal, Bituminous driveway	106	\$5.71	S.Y.	\$606	Means 02 41 13.17 5100; Assumes 5% of paved AOC is replaced annually.
Transportation and Disposal, Asphalt	14	\$25	Ton	\$350	SHA discussions with Waste Management, Inc.
Asphaltic Concrete Pavement, Lots & Driveways, 6" stone base, 2" binder course, 1" topping	950	\$2.93	S.F.	\$2,784	Means 32 12 16.14 0020; Assumes 5% of paved AOC is replaced annually.
Hauling, 20 C.Y. dump truck, 20 mile round trip	9	\$14	L.C.Y	\$123	Means 31 23 23.18 1255
Subtotal, Pavement Restoration				\$3,900	\$3,863
Subtotal, Earthwork Contractor				\$6,400	\$6,361
Landscaping Contractor (Assume 2 visits annually)					
Mowing soil capped AOC, 1st event	93	\$3.00	M.S.F.	\$279	Means 32 01 90.19 4160
Mowing soil capped AOC, 2nd event	93	\$3.00	M.S.F.	\$279	Means 32 01 90.19 4160
Subtotal, Landscaping Contractor				\$560	\$558
Engineer					
Labor, Quarterly Inspections	4	\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate of \$99/hr. See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$594	L.S.	\$594	Assume 15% of labor cost for quarterly inspections.
Labor, Annual Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$137	L.S.	\$137	Assume 5% of labor cost for report preparation.
Subtotal, Engineer				\$7,400	\$7,419
Subtotal, Maintain AOC Cap				\$14,000	\$14,338
Subtotal, O&M Activities				\$14,000	
Scope Contingency (15% O&M Subtotal)				\$2,100	OSWER 5-6: Assume 15% of O&M Subtotal
Bid Contingency (15% O&M Subtotal)				\$2,100	OSWER 5-6: Assume 15% of O&M Subtotal
Subtotal, O&M Activities w/Contingencies				\$18,000	
Professional/Technical Services					
Project Management (10% O&M Subtotal w/Contingencies)				\$1,800	OSWER 5-8: Assume 10% of Annual O&M Subtotal including contingencies
Technical Support (15% O&M Subtotal w/Contingencies)				\$2,700	OSWER 5-8: Assume 15% of Annual O&M Subtotal including contingencies
Subtotal, Professional/Technical Services				\$4,500	
TOTAL ANNUAL O&M COST				\$23,000	

PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities

Maintain Security Fence (every 5 years)

Earthwork Contractor

Security Fence

Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	228	\$36	L.F.	\$8,208	Means 32 31 13.20 0500; Assumes 10% of security fence is repaired every 5 years.
Subtotal, Earthwork Contractor				\$8,200	\$8,208
Subtotal, Maintain Security Fence (every 5 years)				\$8,200	\$8,208

TABLE D-3b.2
Detailed Cost Estimate for
Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Subtotal, Every 5 Years O&M Activities				\$8,200	
<i>Scope Contingency (15% Every 5 Years O&M Activities Subtotal)</i>				\$1,200	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
<i>Bid Contingency (15% Every 5 Years O&M Activities Subtotal)</i>				\$1,200	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Subtotal, Every 5 Years O&M Activities w/Contingencies				\$11,000	
Subtotal, Construction/O&M Activities				\$11,000	
Professional/Technical Services					
<i>Project Management (10% Construction/O&M Activities Subtotal w/Contingencies)</i>				\$1,100	OSWER 5-8: Assume 10% of Construction/O&M Activities Subtotal including contingencies
<i>Technical Support (15% Construction/O&M Activities Subtotal w/Contingencies)</i>				\$1,700	OSWER 5-8: Assume 15% of Construction/O&M Activities Subtotal including contingencies
Five-Year Review					
<i>Engineer</i>					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
Subtotal, Engineer				\$13,000	<i>\$13,020</i>
Subtotal, Five Year Review				\$13,000	
Subtotal, Professional/Technical Services				\$16,000	
TOTAL PERIODIC COSTS				\$27,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sum S.F. = square feet
C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- The following assumptions were used for the quantity estimates associated with excavation remedial process options:
 - We assumed "swell" factor of 18% for excavated soils.
 - We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
- "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- All subtotals and total are rounded to 2 significant numbers. The number in presented italics to the right of rounded subtotals is the unrounded summed value.

Appendix D-3c

Cost Estimates for Alternative AOC-4

Cost Estimate Summary for

Date: October 2007

**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell,
Removal of Culvert, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts**

CAPITAL COSTS**Construction Activities**

Implementation Plans/Submittals	\$200,000
 AOC Excavation	
Contractor	
Mobilization/Demobilization	\$6,900
Site Preparation	\$68,000
Excavation, Soil-Covered AOC	\$730,000
Excavation, Paved AOC	\$32,000
Backfill	\$670,000
Site Restoration	\$66,000
Soil Stabilization	\$620,000
Transportation/Disposal	\$4,700,000
Subtotal, Contractor	\$6,900,000
 Engineer	\$285,000
Laboratory	\$110,000
Subtotal, AOC Excavation	\$7,300,000
 Settling Basing #2 Excavation	
Contractor	
Mobilization/Demobilization	\$3,300
Site Preparation	\$1,300
Excavation	\$27,000
Backfill	\$11,000
Site Restoration	\$2,500
Transportation/Disposal	\$180,000
Subtotal, Contractor	\$230,000
 Engineer	\$13,000
Laboratory	\$4,800
Subtotal, Settling Basin #2 Excavation	\$240,000
 Post-Construction Submittals/As-builts	\$100,000
 Subtotal, Construction Activities	\$7,840,000
Scope Contingency (15% of Construction Activities Subtotal)	\$1,200,000
Bid Contingency (15% of Construction Activities Subtotal)	\$1,200,000
Subtotal, Construction Activities w/Contingencies	\$10,000,000

Cost Estimate Summary for

Date: October 2007

**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell,
Removal of Culvert, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts**

Professional/Technical Services

Remedial Design (8% Construction Activities Subtotal w/Contingencies)	\$800,000
Project management (5% Construction Activities Subtotal w/Contingencies)	\$500,000
Construction Management (6% Construction Activities Subtotal w/Contingencies)	\$600,000

Subtotal, Professional/Technical Services	\$1,900,000
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Institutional Controls

Establish Deed Restrictions	\$15,000
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Subtotal, Institutional Controls	\$15,000
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TOTAL CAPITAL COSTS	\$12,000,000
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ANNUAL O&M COSTS**O&M Activities**

Maintain AOC Cap	
Earthwork Contractor (Assume 1 visit annually)	
Mobilization/Demobilization	\$940
Repairs to Soil Cap	\$1,600
Pavement Restoration	\$3,900
Subtotal, Earthwork Contractor	\$6,400

Landscaping Contractor (Assume 2 visits annually)	\$560
Engineer	\$7,400

Subtotal, Maintain AOC Cap	\$14,000
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Subtotal, O&M Activities	\$14,000
Scope Contingency (15% Annual O&M Activities Subtotal)	\$2,100
Bid Contingency (15% Annual O&M Activities Subtotal)	\$2,100

Subtotal, O&M Activities w/Contingencies	\$18,000
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Professional/Technical Services

Project Management (10% Annual O&M Activities Subtotal w/Contingencies)	\$1,800
Technical Support (15% Annual O&M Activities Subtotal w/Contingencies)	\$2,700

Subtotal, Professional/Technical Services	\$4,500
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TOTAL ANNUAL O&M COST	\$23,000
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Cost Estimate Summary for

Date: October 2007

**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell,
Removal of Culvert, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts**

PERIODIC COSTS**Construction/O&M Activities**

Every 5 Years O&M Activities

Maintain Security Fence (every 5 years)	\$8,200
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Subtotal, Every 5 Years O&M Activities	\$8,200
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Scope Contingency (15% Every 5 Years O&M Activities Subtotal)	\$1,200
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Bid Contingency (15% Every 5 Years O&M Activities Subtotal)	\$1,200
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Subtotal, Every 5 Years O&M Activities w/Contingencies	<u>\$11,000</u>
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Subtotal, Construction/O&M Activities	\$11,000
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Professional/Technical Services

Project Management (10% Construction/O&M Activities Subtotal w/Contingencies)	\$1,100
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Technical Support (15% Construction/O&M Activities Subtotal w/Contingencies)	\$1,700
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Five-Year Review	\$13,000
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Subtotal, Professional/Technical Services	<u>\$16,000</u>
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TOTAL PERIODIC COSTS

\$27,000

TABLE D-3c.1
Cost Estimate Summary for
Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell,
Removal of Culvert, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT

Date: October 2007

PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$12,000,000	\$12,000,000	1	\$12,000,000
Annual O&M Costs	1-100	\$2,300,000	\$23,000	14.3	\$330,000
Periodic Costs	5	\$27,000	\$27,000	0.713	\$19,000
Periodic Costs	10	\$27,000	\$27,000	0.508	\$14,000
Periodic Costs	15	\$27,000	\$27,000	0.362	\$9,800
Periodic Costs	20	\$27,000	\$27,000	0.258	\$7,000
Periodic Costs	25	\$27,000	\$27,000	0.184	\$5,000
Periodic Costs	30	\$27,000	\$27,000	0.131	\$3,500
Periodic Costs	35	\$27,000	\$27,000	0.0937	\$2,500
Periodic Costs	40	\$27,000	\$27,000	0.0668	\$1,800
Periodic Costs	45	\$27,000	\$27,000	0.0476	\$1,300
Periodic Costs	50	\$27,000	\$27,000	0.0339	\$920
Periodic Costs	55	\$27,000	\$27,000	0.0242	\$650
Periodic Costs	60	\$27,000	\$27,000	0.0173	\$470
Periodic Costs	65	\$27,000	\$27,000	0.0123	\$330
Periodic Costs	70	\$27,000	\$27,000	0.00877	\$240
Periodic Costs	75	\$27,000	\$27,000	0.00625	\$170
Periodic Costs	80	\$27,000	\$27,000	0.00446	\$120
Periodic Costs	85	\$27,000	\$27,000	0.00318	\$86
Periodic Costs	90	\$27,000	\$27,000	0.00227	\$61
Periodic Costs	95	\$27,000	\$27,000	0.00162	\$44
Periodic Costs	100	\$27,000	\$27,000	0.00115	\$31

TOTAL PRESENT VALUE OF ALTERNATIVE

\$12,000,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-3c.2
Detailed Cost Estimate for
Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

DESCRIPTION	QTY	UNIT	COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COST ELEMENTS						
Construction Activities						
Implementation Plans/Submittals	1		\$200,000	Ea.	\$200,000	SHA estimate
AOC Excavation						
Contractor						
Mobilization/Demobilization						
Compacter, 70 to 150 HP	2		\$417	Ea.	\$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob
Excavator, Loader, Above 150 HP	6		\$613	Ea.	\$3,678	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob
Small Equipment	2		\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob
Decontaminate Light Equipment	1		\$200	Ea.	\$200	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	5		\$399	Ea.	\$1,995	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.
Subtotal, Mobilization/Demobilization					\$6,900	\$6,915
Site Preparation						
Pavement removal, Bituminous driveways	2,112		\$9.25	S.Y.	\$19,536	Means 02 41 13.17 5100; Assumes H&S level C.
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	800		\$4.28	L.F.	\$3,424	ECHOS 18 05 0206
Sheet Pile River upstream and downstream	3,000		\$15	S.F.	\$45,000	SHA estimate, based on experience.
Subtotal, Site Preparation					\$68,000	\$67,960
Excavation, Soil-Covered AOC						
Strip Soil Cap and Stockpile, 2 C.Y. Hydraulic Excavator, Medium Material	6,600		\$7.66	C.Y.	\$50,556	ECHOS 17 03 0277; Includes truck loading; Assumes H&S level C.
Excavate AOC Soil, 2 C.Y. Hydraulic Excavator, Medium Material	35,000		\$7.66	C.Y.	\$268,100	ECHOS 17 03 0277; Includes truck loading; Assumes H&S level C.
Two, 10-wheel Dump Trucks	35		\$903	Day	\$31,605	ECHOS 33 01 0111; Assumes H&S level C.
950, 3.0 CY, Wheel Loader	277		\$212	Hr.	\$58,795	ECHOS 17 03 0223; Assumes H&S level C.
Bobcat	277		\$180	Hr.	\$49,920	ECHOS Crew Code COBBC; Assumes H&S level C.
Water Truck	48		\$146	Hr.	\$7,008	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	93,000		\$0.06	S.F.	\$5,580	ECHOS 33 08 0585; Assumes H&S level C.
Demolition of Arch Culvert	400		\$51	L.F.	\$20,400	Means 02 41 13.40 0200; Assumes H&S level D.
First River Dewatering Pump	146		\$1,189	8-hr Shift	\$173,594	Means 31 23 19.20 1100
Second and Third Pump	146		\$349	8-hr Shift	\$50,954	Means 31 23 19.20 1120 (x 2)
Additional Pump Discharge Hose; 400 ft ea.	1,200		\$10	L.F.	\$12,000	SHA estimate, based on experience.
10,000 gal Fractionation Tank (coated interior)	3		\$87	Week	\$261	Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings	3		\$125	Week	\$375	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet	3		\$84	Week	\$252	Rain for Rent, Inc. Quote dated 09/24/07
Filtration system, 4-stage tandem unit, 200 gpm	1		\$2,800	Month	\$2,800	SHA discussions with N.E. Environmental Solutions, Inc.
Filtration system hoses	1		\$400	Month	\$400	SHA discussions with N.E. Environmental Solutions, Inc.
Filtration system pumps, 2" submersibles	1		\$800	Month	\$800	SHA discussions with N.E. Environmental Solutions, Inc.
Filters	120		\$8.00	Ea.	\$960	SHA discussions with N.E. Environmental Solutions, Inc.
Subtotal, Excavation of Soil-Covered AOC					\$730,000	\$734,360
Excavation, Paved AOC						
Excavate & Load, 2 C.Y. Hydraulic Excavator, Medium Material	2,500		\$7.66	C.Y.	\$19,150	ECHOS 17 03 0277; Includes truck loading; Assumes H&S level C.
950, 3.0 CY, Wheel Loader	33		\$212	Hr.	\$7,067	ECHOS 17 03 0223; Assumes H&S level C.
Water Truck	33		\$146	Hr.	\$4,818	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	19,000		\$0.06	S.F.	\$1,136	ECHOS 33 08 0585; Assumes H&S level C.
Subtotal, Excavation of Paved AOC					\$32,000	\$32,171

TABLE D-3c.2
Detailed Cost Estimate for
Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
UNIT					
Backfill					
Retaining Wall, Stone gabion, 100 feet long, ave. 8 feet high	89	\$269	C.Y.	\$23,911	Means 32 32 36.10 6020
Unclassified Fill, 6" Lifts, Off-site, Includes Delivery, Spreading, Compaction	24,578	\$19	C.Y.	\$466,978	ECHOS 17 03 0423
Gravel Fill, 6" Lifts	300	\$23	C.Y.	\$6,900	ECHOS 17 03 0430
Hauling, 20 C.Y. Sump Trailer, 20 mile rt	300	\$14	C.Y.	\$4,200	Means 31 23 23.18 1255
Backfill with Stockpiled Material	6,600	\$4.00	C.Y.	\$26,400	ECHOS 17 03 0401
Compact Backfill, by Machine, Sheepsfoot Roller, 6" Lift	32,900	\$1.31	C.Y.	\$43,099	ECHOS 17 03 0514
Topsoil, Furnish & Place, 6" Lifts, Off-site	1,722	\$55	C.Y.	\$94,722	ECHOS 18 05 0301
Subtotal, Backfill				\$670,000	\$666,210
Site Restoration					
Asphaltic Concrete Pavement, Lots & Driveways, 6" stone base, 2" binder course, 1" topping	19,000	\$2.93	S.F.	\$55,670	Means 32 12 16.14 0020
Hauling, 20 C.Y. dump truck, 20 mile round trip	581	\$14	L.C.Y.	\$8,128	Means 31 23 23.18 1255
Hydroseeding	2	\$1,155	Acre	\$2,466	ECHOS 18 05 0401
Subtotal, Site-Restoration				\$66,000	\$66,264
Soil Stabilization					
In-Situ Cement Stabilization, 6%	18,333	\$34	B.C.Y.	\$623,333	ECHOS 17 03 0602; Assumes H&S level C.
Subtotal, Soil Stabilization				\$620,000	\$623,333
Transportation/Disposal					
Asphalt	264	\$25	Ton	\$6,597	SHA discussions with Waste Management, Inc.
Water, Non-Hazardous	315,000	\$0.20	Gal.	\$63,000	SHA discussions with N.E. Environmental Solutions, Inc.
Asbestos-Impacted Soils, Non-Hazardous	57,900	\$80	Ton	\$4,632,000	SHA discussions with Waste Management, Inc.
Subtotal, Transportation/Disposal				\$4,700,000	\$4,701,597
Subtotal, Contractor				\$6,900,000	\$6,898,810
Engineer					
Labor, Oversight	2,500	\$99	Hr.	\$247,500	Although actual project timeline is to be determined, we assume 12 months of engineers oversight will be required; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$37,125	L.S.	\$37,125	Assume 15% of oversight labor cost.
Subtotal, Engineer				\$285,000	\$284,625
Laboratory					
Chemical analysis, Soil Management Assessment Package I	116	\$965	Ea.	\$111,940	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Subtotal, Laboratory				\$110,000	\$111,940
Subtotal, AOC Excavation				\$7,300,000	\$7,295,375
Settling Basing #2 Excavation					
Contractor					
Mobilization/Demobilization					
Compactor, 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; assumes 50 miles per mob/demob
Excavator Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; assumes 50 miles per mob/demob
Decontaminate Medium Equipment	3	\$399	Ea.	\$1,197	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.
Subtotal, Mobilization/Demobilization				\$3,300	\$3,257
Site Preparation					
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	300	\$4.28	L.F.	\$1,284	ECHOS 18 05 0206
Subtotal, Site Preparation				\$1,300	\$1,284

TABLE D-3c.2
Detailed Cost Estimate for
Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

DESCRIPTION	QTY	UNIT	COSTS	UNITS	COST	COMMENTS/REFERENCE
Excavation						
Crawler-mounted, 2.0 C.Y. 235 Hydraulic Excavator	48		\$409	Hr.	\$19,632	ECHOS 17 03 0232; Assumes H&S level C.
Water Truck	48		\$146	Hr.	\$7,008	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	14,000		\$0.06	S.F.	\$840	ECHOS 33 08 0585; Assumes H&S level C.
Subtotal, Excavation					\$27,000	\$27,480
Backfill						
Crawler-mounted, 2.0 C.Y. 235 Hydraulic Excavator	16		\$282	Hr.	\$4,512	ECHOS 17 03 0232
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	16		\$344	Hr.	\$5,504	ECHOS Crew Code COFCQ (Modified)
Compact Backfill, by Machine, Sheepsfoot Roller, 6" Lift	500		\$1.31	C.Y.	\$655	ECHOS 17 03 0514
Subtotal, Backfill					\$11,000	\$10,671
Site Restoration						
Seeding, Vegetative Cover	0.33		\$7,632	Acre	\$2,519	ECHOS 18 05 0402
Subtotal, Site-Restoration					\$2,500	\$2,519
Transportation/Disposal						
Asbestos-Impacted Soils, Non-Hazardous	2,250		\$80	Ton	\$180,000	SHA discussions with Waste Management, Inc.; Includes stabilization additive.
Subtotal, Transportation/Disposal					\$180,000	\$180,000
Subtotal, Contractor					\$230,000	\$225,211
Engineer						
Labor, Oversight	110		\$99	Hr.	\$10,890	Assumes 2 weeks of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1		\$1,634	L.S.	\$1,634	Assumes 15% of oversight labor cost.
Subtotal, Engineer					\$13,000	\$12,524
Laboratory						
Chemical analysis, Soil Management Assessment	5		\$965	Ea.	\$4,825	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Subtotal, Laboratory					\$4,800	\$4,825
Subtotal, Settling Basin #2 Excavation					\$240,000	\$242,560
Post-Construction Submittals/As-builts	1		\$100,000	Ea.	\$100,000	SHA estimate
Subtotal, Construction Activities					\$7,840,000	
<i>Scope Contingency (15% of Construction Activities Subtotal)</i>					\$1,200,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
<i>Bid Contingency (15% of Construction Activities Subtotal)</i>					\$1,200,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities w/Contingencies					\$10,000,000	
Professional/Technical Services						
<i>Remedial Design (8% Construction Activities Subtotal w/Contingencies)</i>					\$800,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
<i>Project management (5% Construction Activities Subtotal w/Contingencies)</i>					\$500,000	OSWER 5-8: Assume 5% of Construction Activities Subtotal including contingencies
<i>Construction Management (6% Construction Activities Subtotal w/Contingencies)</i>					\$600,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services					\$1,900,000	

TABLE D-3c.2
Detailed Cost Estimate for
Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
UNIT					
Institutional Controls					
Establish Deed Restrictions					
<i>Engineer</i>					
Establish Institutional Controls in the form of Deed Restrictions	3	\$5,000	Ea.	\$15,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				\$15,000	
Subtotal, Establish Deed Restrictions				\$15,000	
Subtotal, Institutional Controls				\$15,000	
TOTAL CAPITAL COSTS				\$12,000,000	

ANNUAL O&M COST ELEMENTS

O&M Activities

Maintain AOC Cap

Earthwork Contractor (Assume 1 visit annually)

Mobilization/Demobilization					
Equipment, Truck 2 Axle, Highway, 33,000 GVW, 6x2,2	1	\$452	Day	\$452	ECHOS 33 01 0111
Crew, 100 miles, per person	2	\$192	Ea.	\$384	ECHOS 33 01 0204
Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Subtotal, Mobilization/Demobilization				\$940	\$940

Repairs to Soil Cap

Bobcat	8	\$126	Hr.	\$1,008	ECHOS Crew Code COBBC; Assumes H&S level D.
Topsoil, Furnish & Place, 6" Lifts, Off-site	10	\$55	C.Y.	\$550	ECHOS 08 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	1	\$27	M.S.F.	\$27	Means 32 92 19.13 0800; Assumes 5% of soil capped AOC is re-seeded annually.
Subtotal, Repairs to Soil Cap				\$1,600	\$1,558

Pavement Restoration

Pavement Removal, Bituminous driveway	106	\$5.71	S.Y.	\$606	Means 02 41 13.17 5100; Assumes 5% of paved AOC is replaced annually.
Transportation and Disposal, Asphalt	14	\$25	Ton	\$350	SHA discussions with Waste Management, Inc.
Asphaltic Concrete Pavement, Lots & Driveways, 6" stone base, 2" binder course, 1" topping	950	\$2.93	S.F.	\$2,784	Means 32 12 16.14 0020; Assumes 5% of paved AOC is replaced annually.
Hauling, 20 C.Y. dump truck, 20 mile round trip	9	\$14	L.C.Y.	\$123	Means 31 23 23.18 1255
Subtotal, Pavement Restoration				\$3,900	\$3,863
Subtotal, Earthwork Contractor				\$6,400	\$6,361

Landscaping Contractor (Assume 2 visits annually)

Mowing soil capped AOC, 1st event	93	\$3.00	M.S.F.	\$279	Means 32 01 90.19 4160
Mowing soil capped AOC, 2nd event	93	\$3.00	M.S.F.	\$279	Means 32 01 90.19 4160
Subtotal, Landscaping Contractor				\$560	\$558

Engineer

Labor, Quarterly Inspections	4	\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate of \$99/hr. See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$594	L.S.	\$594	Assume 15% of labor cost for quarterly inspections.
Labor, Annual Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$137	L.S.	\$137	Assume 5% of labor cost for report preparation.
Subtotal, Engineer				\$7,400	\$7,419
Subtotal, Maintain AOC Cap				\$14,000	\$14,338

TABLE D-3c.2
Detailed Cost Estimate for
Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
	UNIT Subtotal, O&M Activities			\$14,000	
<i>Scope Contingency (15% Annual O&M Activities Subtotal)</i>				\$2,100	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
<i>Bid Contingency (15% Annual O&M Activities Subtotal)</i>				\$2,100	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
Subtotal, O&M Activities w/Contingencies				\$18,000	
Professional/Technical Services					
<i>Project Management (10% Annual O&M Activities Subtotal w/Contingencies)</i>				\$1,800	OSWER 5-8: Assume 10% of Annual O&M Activities Subtotal including contingencies
<i>Technical Support (15% Annual O&M Activities Subtotal w/Contingencies)</i>				\$2,700	OSWER 5-8: Assume 15% of Annual O&M Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$4,500	
TOTAL ANNUAL O&M COST				\$23,000	

PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities

Maintain Security Fence (every 5 years)

Earthwork Contractor

Security Fence

Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	228	\$36	L.F.	\$8,208	Means 32 31 13.20 0500; Assumes 10% of security fence is repaired every 5 years.
Subtotal, Earthwork Contractor				\$8,200	\$8,208
Subtotal, Maintain Security Fence (every 5 years)				\$8,200	\$8,208
Subtotal, Every 5 Years O&M Activities				\$8,200	
<i>Scope Contingency (15% Every 5 Years O&M Activities Subtotal)</i>				\$1,200	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
<i>Bid Contingency (15% Every 5 Years O&M Activities Subtotal)</i>				\$1,200	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Subtotal, Every 5 Years O&M Activities w/Contingencies				\$11,000	
Subtotal, Construction/O&M Activities				\$11,000	

TABLE D-3c.2
Detailed Cost Estimate for
Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
 Date: October 2007

AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

DESCRIPTION	QTY	UNIT	COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services						
<i>Project Management (10% Construction/O&M Activities Subtotal w/Contingencies)</i>					\$1,100	OSWER 5-8: Assume 10% of Construction/O&M Activities Subtotal including contingencies
<i>Technical Support (15% Construction/O&M Activities Subtotal w/Contingencies)</i>					\$1,700	OSWER 5-8: Assume 15% of Construction/O&M Activities Subtotal including contingencies
Five-Year Review						
<i>Engineer</i>						
Labor	1		\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1		\$620	L.S.	\$620	Assume 5% of labor costs.
Subtotal, Engineer					\$13,000	<i>\$13,020</i>
Subtotal, Five-Year Review					\$13,000	<i>\$13,020</i>
Subtotal, Professional/Technical Services					\$16,000	
TOTAL PERIODIC COSTS					\$27,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sum S.F. = square feet
 C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
 Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
 RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.
 RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
 ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
 ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- The following assumptions were used for the quantity estimates associated with excavation remedial process options:
 - We assumed "swell" factor of 18% for excavated soils.
 - We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
- "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- All subtotals and total are rounded to 2 significant numbers. The number in presented italics to the right of rounded subtotals is the unrounded summed value.

APPENDIX D-4

SSW ALTERNATIVE COST ESTIMATES

Appendix D-4a

Cost Estimates for Alternative SSW-2

TABLE D-4a.1
Cost Estimate Summary for
Alternative SSW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COSTS

Construction Activities

Implementation Plans/Submittals	\$13,000
Install Security Fence	
Contractor	\$130,000
Subtotal, Install Security Fence	\$130,000
Post-Construction Submittals/As-Builts	\$6,500
Subtotal, Construction Activities	\$149,500
Scope Contingency (15% Construction Activities Subtotal)	\$22,000
Bid Contingency (15% Construction Activities Subtotal)	\$22,000
Subtotal, Construction Activities with Contingencies	\$190,000

Professional/Technical Services

Project Management (8% Construction Activities Subtotal w/Contingencies)	\$15,000
Remedial Design (15% Construction Activities Subtotal w/Contingencies)	\$29,000
Construction Management (10% Construction Activities Subtotal w/Contingencies)	\$19,000
Subtotal, Professional/Technical Services	\$63,000

Institutional Controls

Establish Deed Restrictions	\$55,000
Subtotal, Establish Institutional Controls	\$55,000

TOTAL, CAPITAL COSTS

\$310,000

ANNUAL O&M COSTS

O&M Activities

Quarterly Inspections	\$7,400
Subtotal, O&M Activities	\$7,400
Scope Contingency (15% O&M Activities Subtotal)	\$1,100
Bid Contingency (15% O&M Activities Subtotal)	\$1,100
Subtotal, O&M Activities with Contingencies	\$10,000

Professional/Technical Services

Project Management (10% O&M Activities Subtotal w/Contingencies)	\$1,000
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$1,500
Subtotal, Professional/Technical Services	\$2,500

TOTAL, ANNUAL O&M COSTS

\$13,000

TABLE D-4a.1
Cost Estimate Summary for
Alternative SSW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities

Maintain Existing Security Fencing (every 5 years) \$12,000

Subtotal, Every 5 Years O&M Activities \$12,000

Scope Contingency (15% of Every 5 Years O&M Activities Subtotal) \$1,800

Bid Contingency (15% of Every 5 Years O&M Activities Subtotal) \$1,800

Subtotal, Construction Activities with Contingencies \$16,000

Professional/Technical Services

Project Management (10% of Every 5 Years O&M Activities Subtotal w/Contingencies) \$1,600

Technical Support (15% of Every 5 Years O&M Activities Subtotal w/Contingencies) \$2,400

Five-Year Review \$13,000

Subtotal, Professional/Technical Services \$17,000

TOTAL, PERIODIC COSTS

\$33,000

PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$310,000	\$310,000	1	\$310,000
Annual O&M Costs	1-100	\$1,300,000	\$13,000	14.3	\$190,000
Periodic Costs	5	\$33,000	\$33,000	0.713	\$24,000
Periodic Costs	10	\$33,000	\$33,000	0.508	\$17,000
Periodic Costs	15	\$33,000	\$33,000	0.362	\$12,000
Periodic Costs	20	\$33,000	\$33,000	0.258	\$8,500
Periodic Costs	25	\$33,000	\$33,000	0.184	\$6,100
Periodic Costs	30	\$33,000	\$33,000	0.131	\$4,300
Periodic Costs	35	\$33,000	\$33,000	0.0937	\$3,100
Periodic Costs	40	\$33,000	\$33,000	0.0668	\$2,200
Periodic Costs	45	\$33,000	\$33,000	0.0476	\$1,600
Periodic Costs	50	\$33,000	\$33,000	0.0339	\$1,100
Periodic Costs	55	\$33,000	\$33,000	0.0242	\$800
Periodic Costs	60	\$33,000	\$33,000	0.0173	\$570
Periodic Costs	65	\$33,000	\$33,000	0.0123	\$410
Periodic Costs	70	\$33,000	\$33,000	0.00877	\$290
Periodic Costs	75	\$33,000	\$33,000	0.00625	\$210
Periodic Costs	80	\$33,000	\$33,000	0.00446	\$150
Periodic Costs	85	\$33,000	\$33,000	0.00318	\$100
Periodic Costs	90	\$33,000	\$33,000	0.00227	\$75
Periodic Costs	95	\$33,000	\$33,000	0.00162	\$53
Periodic Costs	100	\$33,000	\$33,000	0.00115	\$38

TOTAL PRESENT VALUE OF ALTERNATIVE

\$580,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-4a.2
Detailed Cost Estimate for
Alternative SSW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-2: Limited Action

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS					
Construction Activities					
Implementation Plans/Submittals	1	\$13,000	Ea.	\$13,000	SHA estimate
Install Security Fence					
<i>Contractor</i>					
Clearing, Medium Brush with Average Grub & Some Trees	1.0	\$1,254	Acre	\$1,254	ECHOS 17 01 0103; Assumes distance of 1,700 feet by 10 feet wide will be cleared at same level of effort as 0.8 acre.
Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	3,350	\$36	L.F.	\$120,600	Means 32 31 13.20 0500; Assumes 3,100 L.F. in vicinity of Lewis Pond, and 250 L.F. at the tailrace.
Gate for 6' high fence, 1-5/8" frame, 3' wide, galv. steel	12	\$358	Ea.	\$4,296	Means 32 31 13.20 1400
Subtotal, Contractor				\$130,000	\$126,150
Subtotal, Install Security Fence				\$130,000	\$126,150
Post-Construction Submittals/As-Built	1	\$6,500	Ea.	\$6,500	SHA estimate
Subtotal, Construction Activities				\$149,500	
<i>Scope Contingency (15% Construction Activities Subtotal)</i>				\$22,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
<i>Bid Contingency (15% Construction Activities Subtotal)</i>				\$22,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities with Contingencies				\$190,000	
Professional/Technical Services					
<i>Project Management (8% Construction Activities Subtotal w/Contingencies)</i>				\$15,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
<i>Remedial Design (15% Construction Activities Subtotal w/Contingencies)</i>				\$29,000	OSWER 5-8: Assume 15% of Construction Activities Subtotal including contingencies
<i>Construction Management (10% Construction Activities Subtotal w/Contingencies)</i>				\$19,000	OSWER 5-8: Assume 10% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$63,000	
Institutional Controls					
Establish Deed Restrictions					
<i>Engineer</i>					
Establish Institutional Controls in the form of Deed Restrictions	11	\$5,000	Ea.	\$55,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				\$55,000	\$55,000
Subtotal, Establish Deed Restrictions				\$55,000	\$55,000
Subtotal, Establish Institutional Controls				\$55,000	
TOTAL, CAPITAL COSTS				\$310,000	

TABLE D-4a.2
Detailed Cost Estimate for
Alternative SSW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-2: Limited Action

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
ANNUAL O&M COSTS					
O&M Activities					
Quarterly Inspections					
<i>Engineer</i>					
Labor, Quarterly Inspections	4	\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate of \$99/hr. See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$594	L.S.	\$594	Assume 15% of field labor cost.
Labor, Annual Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$137	L.S.	\$137	Assume 5% of report preparation labor cost.
Subtotal, Engineer				\$7,400	\$7,419
Subtotal, Quarterly Inspections				\$7,400	\$7,419
Subtotal, O&M Activities				\$7,400	
<i>Scope Contingency (15% O&M Activities Subtotal)</i>				\$1,100	OSWER 5-6: Assume 15% of O&M Activities Subtotal
<i>Bid Contingency (15% O&M Activities Subtotal)</i>				\$1,100	OSWER 5-6: Assume 15% of O&M Activities Subtotal
Subtotal, O&M Activities with Contingencies				\$10,000	
Professional/Technical Services					
<i>Project Management (10% O&M Activities Subtotal w/Contingencies)</i>				\$1,000	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
<i>Technical Support (15% O&M Activities Subtotal w/Contingencies)</i>				\$1,500	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$2,500	
TOTAL, ANNUAL O&M COSTS				\$13,000	

PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities

Maintain Existing Security Fencing (every 5 years)

Contractor

Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	335	\$36	L.F.	\$12,060	Means 32 31 13.20 0500; Assumes 10% of security fence is repaired every five years.
Subtotal, Contractor				\$12,000	\$12,060
Subtotal, Maintain Existing Security Fence (every 5 years)				\$12,000	\$12,060
Subtotal, Every 5 Years O&M Activities				\$12,000	
<i>Scope Contingency (15% of Every 5 Years O&M Activities Subtotal)</i>				\$1,800	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
<i>Bid Contingency (15% of Every 5 Years O&M Activities Subtotal)</i>				\$1,800	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Subtotal, Construction Activities with Contingencies				\$16,000	

TABLE D-4a.2
Detailed Cost Estimate for
Alternative SSW-2: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-2: Limited Action

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
<i>Project Management (10% of Every 5 Years O&M Activities Subtotal w/Contingencies)</i>				\$1,600	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
<i>Technical Support (15% of Every 5 Years O&M Activities Subtotal w/Contingencies)</i>				\$2,400	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Five-Year Review					
Engineer					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
Subtotal, Engineer				\$13,000	<i>\$13,020</i>
Subtotal, Five-Year Review				\$13,000	<i>\$13,020</i>
Subtotal, Professional/Technical Services				\$17,000	
TOTAL, PERIODIC COSTS				\$33,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sum S.F. = square feet
C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

Appendix D-4b

Cost Estimates for Alternative SSW-3

TABLE D-4b.1
Cost Estimate Summary for
Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos \geq 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos \geq 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COSTS

Construction Activities

Implementation Plans/Submittals	\$70,000
Residential Soil/Sediment Excavations	
Contractor	
Mobilization/Demobilization	\$4,900
Site Preparation	\$2,600
Excavation	\$34,000
Backfill	\$21,000
Site Restoration	\$22,000
Soil Stabilization	\$28,000
Transportation/Disposal	\$100,000
Subtotal, Contractor	\$220,000
Engineer	\$13,000
Laboratory	\$4,400
Subtotal, Residential Soil/Sediment Excavations	\$230,000
Former Mill Tailrace Excavation	
Contractor	
Mobilization/Demobilization	\$4,700
Site Preparation	\$20,000
Dredging & Dewatering	\$17,000
Wetlands Restoration	\$25,000
Soil Stabilization	\$1,600
Transportation/Disposal	\$16,000
Subtotal, Contractor	\$85,000
Engineer	\$13,000
Laboratory	\$1,200
Subtotal, Former Mill Tailrace Excavation	\$100,000
Upgrade/Repair West Street Dam	
Contractor	
Mobilization/Demobilization	\$2,200
Upgrade/Repair Dam	\$120,000
Subtotal, Contractor	\$130,000
Engineer	\$15,000
Subtotal, Upgrade/Repair West Street Dam	\$140,000
Post-Construction Submittals/As-Builts	\$24,000

TABLE D-4b.1
Cost Estimate Summary for
Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos \geq 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos \geq 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Subtotal, Construction Activities	\$560,000
Scope Contingency (15% Construction Activities Subtotal)	\$84,000
Bid Contingency (15% Construction Activities Subtotal)	\$84,000
Subtotal, Construction Activities with Contingencies	\$730,000
Professional/Technical Services	
Project Management (6% Construction Activities Subtotal w/Contingencies)	\$44,000
Remedial Design (12% Construction Activities Subtotal w/Contingencies)	\$88,000
Construction Management (8% Construction Activities Subtotal w/Contingencies)	\$58,000
Subtotal, Professional/Technical Services	\$190,000
Institutional Controls	
Establish Deed Restrictions	\$35,000
Subtotal, Institutional Controls	\$35,000
TOTAL, CAPITAL COSTS	\$1,000,000
ANNUAL O&M COSTS	
O&M Activities	
Annual West Street Dam Inspection	\$10,000
Subtotal, O&M Activities	\$10,000
Scope Contingency (15% Annual O&M Activities Subtotal)	\$1,500
Bid Contingency (15% Annual O&M Activities Subtotal)	\$1,500
Subtotal, O&M Activities with Contingencies	\$13,000
Professional/Technical Services	
Project Management (10% O&M Activities Subtotal w/Contingencies)	\$1,300
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$1,950
Subtotal, Professional/Technical Services	\$3,300
TOTAL, ANNUAL O&M COSTS	\$16,000
PERIODIC COSTS	
O&M Activities	
Year 1 Only O&M Activities	
Post-Reconstruction Wetlands Monitoring (year 1 only)	\$7,200
Subtotal, Year 1 Only O&M Activities	\$7,200
Scope Contingency (15% Year 1 Only O&M Activities Subtotal)	\$1,100
Bid Contingency (15% Year 1 Only O&M Activities Subtotal)	\$1,100
Subtotal, Year 1 Only O&M Activities with Contingencies	\$9,000
Subtotal, O&M Activities	\$9,000

TABLE D-4b.1
Cost Estimate Summary for
Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos \geq 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos \geq 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Professional/Technical Services

Project Management (10% O&M Activities Subtotal w/Contingencies)	\$900
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$1,350
Five-Year Review	\$13,000

Subtotal, Professional/Technical Services	\$15,000
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TOTAL, PERIODIC COSTS	\$24,000
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PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$1,000,000	\$1,000,000	1	\$1,000,000
Annual O&M Costs	1-100	\$1,600,000	\$16,000	14.3	\$230,000
Periodic Costs	1	\$11,000	\$11,000	0.935	\$10,000
Periodic Costs	5	\$13,000	\$13,000	0.713	\$9,300
Periodic Costs	10	\$13,000	\$13,000	0.508	\$6,600
Periodic Costs	15	\$13,000	\$13,000	0.362	\$4,700
Periodic Costs	20	\$13,000	\$13,000	0.258	\$3,400
Periodic Costs	25	\$13,000	\$13,000	0.184	\$2,400
Periodic Costs	30	\$13,000	\$13,000	0.131	\$1,700
Periodic Costs	35	\$13,000	\$13,000	0.0937	\$1,200
Periodic Costs	40	\$13,000	\$13,000	0.0668	\$870
Periodic Costs	45	\$13,000	\$13,000	0.0476	\$620
Periodic Costs	50	\$13,000	\$13,000	0.0339	\$440
Periodic Costs	55	\$13,000	\$13,000	0.0242	\$310
Periodic Costs	60	\$13,000	\$13,000	0.0173	\$220
Periodic Costs	65	\$13,000	\$13,000	0.0123	\$160
Periodic Costs	70	\$13,000	\$13,000	0.00877	\$110
Periodic Costs	75	\$13,000	\$13,000	0.00625	\$81
Periodic Costs	80	\$13,000	\$13,000	0.00446	\$58
Periodic Costs	85	\$13,000	\$13,000	0.00318	\$41
Periodic Costs	90	\$13,000	\$13,000	0.00227	\$30
Periodic Costs	95	\$13,000	\$13,000	0.00162	\$21
Periodic Costs	100	\$13,000	\$13,000	0.00115	\$15

TOTAL PRESENT VALUE OF ALTERNATIVE	\$1,300,000
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Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-4b.2
Detailed Cost Estimate for
Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS					
Construction Activities					
Implementation Plans/Submittals	1	\$70,000	Ea.	\$70,000	SHA estimate
Residential Soil/Sediment Excavations					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader, Compactor 70 to 150 HP	4	\$417	Ea.	\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decontaminate Light Equipment	1	\$199	Ea.	\$199	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.
Subtotal, Mobilization/Demobilization				\$4,900	\$4,897
Site Preparation					
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	600	\$4.28	L.F.	\$2,568	ECHOS 18 05 0206
Subtotal, Site Preparation				\$2,600	\$2,568
Excavation					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	40	\$299	Hr.	\$11,960	ECHOS 17 03 0231; Assumes H&S level C.
926, 2.0 CY, Wheel Loader	40	\$204	Hr.	\$8,160	ECHOS 17 03 0222; Assumes H&S level C.
Bobcat	40	\$180	Hr.	\$7,200	ECHOS Crew Code COBBC; Assumes H&S level C.
Water Truck	40	\$103	Hr.	\$4,896	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	21,400	\$0.06	S.F.	\$1,284	ECHOS 33 08 0585; Assumes H&S level C.
Subtotal, Excavation				\$34,000	\$33,500
Backfill					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	24	\$199	Hr.	\$4,776	ECHOS 17 03 0231
926, 2.0 CY, Wheel Loader	24	\$130	Hr.	\$3,120	ECHOS 17 03 0222
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	24	\$344	Hr.	\$8,256	ECHOS Crew Code COFCQ (Modified)
Unclassified Fill, Delivered, Off-site	424	\$12	C.Y.	\$5,088	ECHOS 02223 1001
Subtotal, Backfill				\$21,000	\$21,240
Site Restoration					
Topsoil, Furnish & Place, 6" Lifts, Off-site	397	\$55	C.Y.	\$21,835	ECHOS 18 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	22	\$27	M.S.F.	\$594	Means 32 92 19.13 0800
Subtotal, Site Restoration				\$22,000	\$22,429
Soil Stabilization					
In-Situ Cement Stabilization, 6%	820	\$34	B.C.Y.	\$27,880	ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization; Assumes H&S level C.
Subtotal, Soil Stabilization				\$28,000	\$27,880
Transportation/Disposal					
Asbestos-Impacted Soils, Non-Hazardous	1,304	\$80	Ton	\$104,320	SHA discussions with Waste Management, Inc.; Includes excavated material plus stabilizing additive at 6%.
Subtotal, Transportation & Disposal				\$100,000	\$104,320
Subtotal, Contractor				\$220,000	\$216,834

TABLE D-4b.2
Detailed Cost Estimate for
Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor	110	\$99	Hr.	\$10,890	Assumes 2 weeks of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$1,634	L.S.	\$1,634	Assumes 15% of labor cost
Subtotal, Engineer				\$13,000	\$12,524
Laboratory					
Chemical analysis, Soil Management Assessment Package I	4	\$965	Ea.	\$3,860	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Lead Confirmatory	5	\$13	Ea.	\$65	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	10	\$50	Ea.	\$500	SHA discussions with EMSL Analytical, Inc.
Subtotal, Laboratory				\$4,400	\$4,425
Subtotal, Residential Soil/Sediment Excavations				\$230,000	\$233,783
Former Mill Tailrace Excavation					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Clamshell, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Mob/Demob, Fractionation Tank	2	\$305	Ea.	\$610	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes frac tank; Assumes H&S level D.
Subtotal, Mobilization/Demobilization				\$4,700	\$4,674
Site Preparation					
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	150	\$4.28	L.F.	\$642	ECHOS 18 05 0206
Turbidity Curtains including Deployment	100	\$190	L.F.	\$19,000	SHA discussions with Gunderboom, Inc.
Subtotal, Site Preparation				\$20,000	\$19,642
Dredging & Dewatering					
1.5 CY Clamshell, with 60' Boom	16	\$642	Hr.	\$10,272	ECHOS 17 03 0252; Assumes H&S level C.
926, 2.0 CY, Wheel Loader	16	\$204	Hr.	\$3,264	ECHOS 17 03 0222; Assumes H&S level C.
Bobcat	16	\$180	Hr.	\$2,880	ECHOS Crew Code COBBC; Assumes H&S level C.
10,000 gal Fractionation Tank (coated interior)	2	\$87	Week	\$174	Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings	2	\$125	Week	\$250	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet	2	\$84	Week	\$168	Rain for Rent, Inc. Quote dated 09/24/07
Subtotal, Dredging & Dewatering				\$17,000	\$17,008

TABLE D-4b.2
Detailed Cost Estimate for
Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Wetlands Restoration					
(Includes restoration of additional 400 S.F. due to construction disturbance)					
1.5 CY Clamshell, with 60' Boom	16	\$435	Hr.	\$6,960	ECHOS 17 03 0252
926, 2.0 CY, Wheel Loader	16	\$130	Hr.	\$2,080	ECHOS 17 03 0222
Bobcat	16	\$112	Hr.	\$1,792	ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	33	\$55	C.Y.	\$1,815	ECHOS 18 05 0301
Screened Leaf Compost, Delivered	25	\$17	C.Y.	\$425	SHA discussions with Agresource, Inc.
Trees, 2-3' CG - 15' on center, 5/M.S.F.	2	\$50	Ea.	\$100	SHA discussions with Normandeau Associates, Inc.
Shrubs, 18-24" CG - 8' on center, 15/M.S.F.	6	\$20	Ea.	\$120	SHA discussions with Normandeau Associates, Inc.
Fertilizer Tablets, 1/plant, 250 count per box	1	\$30	Ea.	\$30	SHA discussions with Normandeau Associates, Inc.
Wetland Seed Mix	2	\$75	Pounds	\$150	SHA discussions with Normandeau Associates, Inc.
Conservation Seed Mix	1	\$50	Pounds	\$50	SHA discussions with Normandeau Associates, Inc.
Annual Rye Grass	1	\$1.00	Pounds	\$1	SHA discussions with Normandeau Associates, Inc.
Aquatic Plants, 2' on center, wetland, 250/M.S.F.	275	\$5.00	Ea.	\$1,375	SHA discussions with Normandeau Associates, Inc.
Planting/Seeding Labor	8	\$66	Hr.	\$528	SHA discussions with Normandeau Associates, Inc.; ECHOS Crew Code ULABA
Wetlands Specialist, Construction Oversight	40	\$100	Hr.	\$4,000	SHA discussions with Normandeau Associates, Inc.; Assumes upto 5 site visits during and immediately following construction/restoration activities.
Surveying, 2-person Crew	2	\$2,950	Day	\$5,899	ECHOS 99 04 1201; Assumes H&S level C.
Subtotal, Wetlands Restoration				\$25,000	\$25,325
Soil Stabilization					
Cement Stabilization, 6%	50	\$32	B.C.Y.	\$1,600	ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization; Assumes H&S level C.
Subtotal, Soil Stabilization				\$1,600	\$1,600
Transportation/Disposal					
Asbestos-Impacted Soils, Non-Hazardous	93	\$125	Ton	\$11,625	SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due to
Water, Asbestos-Impacted, Non-Hazardous	5,000	\$0.95	Gal.	\$4,750	SHA discussions with N.E. Environmental Solutions, Inc.; Assumes no pre-treatment of water.
Subtotal, Transportation & Disposal				\$16,000	\$16,375
Subtotal, Contractor				\$85,000	\$84,624
Engineer					
Labor	110	\$99	hr	\$10,890	Assumes 10 days of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$1,634	l.s.	\$1,634	Assumes 15% of labor cost
Subtotal, Engineer				\$13,000	\$12,524
Laboratory					
Chemical analysis, Soil Management Assessment Package I	1	\$965	Ea.	\$965	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	5	\$50	Ea.	\$250	SHA discussions with EMSL Analytical, Inc.
Subtotal, Laboratory				\$1,200	\$1,215
Subtotal, Former Mill Tailrace Excavation				\$100,000	\$98,363
Upgrade/Repair West Street Dam					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Crane, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Crew, 100 miles, per person	5	\$192	Ea.	\$960	ECHOS 33 01 0204
Subtotal, Mobilization/Demobilization				\$2,200	\$2,186

TABLE D-4b.2
Detailed Cost Estimate for
Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Upgrade/Repair Dam					
Cleaning Masonry, High pressure water and chemical	280	\$4.00	S.F	\$1,120	Means 04 01 30.20 0440
Grout, non-shrink, non-metallic, 1" deep	210	\$23	S.F.	\$4,830	Means 03 62 13.50 0300
Install gate and automatic level controls	80	\$499	Hr.	\$39,920	ECHOS Crew Code UOEHC
Gate & Automatic Level Control	1	\$40,000	L.S.	\$40,000	SHA discussions with Goldsmith, Prest, & Rangwall, Inc.
Fabricated Pedestrian Bridge/Deck, steel, trusted or arch spans, compl. in place, 8'-wide, 40' span	320	\$119	S.F	\$38,080	Means 32 34 20.10 0300
Subtotal, Upgrade/Repair Dam				\$120,000	\$123,950
Subtotal, Contractor				\$130,000	\$126,136
Engineer					
Labor	132	\$99	hr	\$13,068	Assumes 3 weeks of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$1,961	l.s.	\$1,961	Assumes 15% of labor cost
Subtotal, Engineer				\$15,000	\$15,029
Subtotal, Upgrade/Repair West Street Dam				\$140,000	\$141,165
Post-Construction Submittals/As-Built	1	\$24,000	Ea.	\$24,000	SHA estimate
Subtotal, Construction Activities				\$560,000	
<i>Scope Contingency (15% Construction Activities Subtotal)</i>				\$84,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
<i>Bid Contingency (15% Construction Activities Subtotal)</i>				\$84,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities with Contingencies				\$730,000	
Professional/Technical Services					
<i>Project Management (6% Construction Activities Subtotal w/Contingencies)</i>				\$44,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
<i>Remedial Design (12% Construction Activities Subtotal w/Contingencies)</i>				\$88,000	OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies
<i>Construction Management (8% Construction Activities Subtotal w/Contingencies)</i>				\$58,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$190,000	
Institutional Controls					
Establish Deed Restrictions					
Engineer					
Establish Institutional Controls in the form of Deed Restrictions	7	\$5,000	Ea.	\$35,000	Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				\$35,000	\$35,000
Subtotal, Establish Deed Restrictions				\$35,000	\$35,000
Subtotal, Institutional Controls				\$35,000	
TOTAL, CAPITAL COSTS				\$1,000,000	

TABLE D-4b.2
Detailed Cost Estimate for
Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
ANNUAL O&M COSTS					
O&M Activities					
Annual West Street Dam Inspection					
<i>Engineer</i>					
West Street Dam Inspection & Minor Repairs	1	\$10,000	L.S.	\$10,000	SHA estimate.
Subtotal, Engineer				\$10,000	\$10,000
Subtotal, Annual West Street Dam Inspection				\$10,000	\$10,000
Subtotal, O&M Activities				\$10,000	
<i>Scope Contingency (15% Annual O&M Activities Subtotal)</i>				\$1,500	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
<i>Bid Contingency (15% Annual O&M Activities Subtotal)</i>				\$1,500	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
Subtotal, O&M Activities with Contingencies				\$13,000	
Professional/Technical Services					
<i>Project Management (10% O&M Activities Subtotal w/Contingencies)</i>				\$1,300	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
<i>Technical Support (15% O&M Activities Subtotal w/Contingencies)</i>				\$1,950	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$3,300	
TOTAL, ANNUAL O&M COSTS				\$16,000	

PERIODIC COSTS

O&M Activities

Year 1 Only O&M Activities

Post-Reconstruction Wetlands Monitoring (year 1 only)					
<i>Contractor</i>					
Post-Construction Wetlands Monitoring	1	\$7,200	L.S.	\$7,200	SHA discussions with Normandeau Associates, Inc.; Assumes upto 3 post-reconstruction site visits to occur during the following two growing seasons and summary report preparation.
Subtotal, Contractor				\$7,200	\$7,200
Subtotal, Post-Reconstruction Wetlands Monitoring (year 1 only)				\$7,200	\$7,200
Subtotal, Year 1 Only O&M Activities				\$7,200	
<i>Scope Contingency (15% Year 1 Only O&M Activities Subtotal)</i>				\$1,100	OSWER 5-6: Assume 15% of Year 1 Only O&M Activities Subtotal
<i>Bid Contingency (15% Year 1 Only O&M Activities Subtotal)</i>				\$1,100	OSWER 5-6: Assume 15% of Year 1 Only O&M Activities Subtotal
Subtotal, Year 1 Only O&M Activities with Contingencies				\$9,000	
Subtotal, O&M Activities				\$9,000	

TABLE D-4b.2
Detailed Cost Estimate for
Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
<i>Project Management (10% O&M Activities Subtotal w/Contingencies)</i>				\$900	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
<i>Technical Support (15% O&M Activities Subtotal w/Contingencies)</i>				\$1,350	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Five-Year Review					
<i>Engineer</i>					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
Subtotal, Engineer				\$13,000	<i>\$13,020</i>
Subtotal, Five-Year Review				\$13,000	<i>\$13,020</i>
Subtotal, Professional/Technical Services				\$15,000	
TOTAL, PERIODIC COSTS				\$24,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sum S.F. = square feet
C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- The following assumptions were used for the former mill tailrace quantity estimates:
 - We assumed "swell" factor of 18% for excavated soils, when estimating L.C.Y. volume.
 - We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
 - We assumed 1 cubic yard of dredged and dewatered sediments weighs approximately 1.75 tons.
- "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

Appendix D-4c

Cost Estimates for Alternative SSW-4

TABLE D-4c.1
Cost Estimate Summary for
Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos \geq 1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos \geq 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COSTS

Construction Activities

Implementation Plans/Submittals	\$74,000
Residential Soil/Sediment Excavations	
Contractor	
Mobilization/Demobilization	\$4,900
Site Preparation	\$2,600
Excavation	\$34,000
Backfill	\$21,000
Site Restoration	\$22,000
Soil Stabilization	\$28,000
Transportation/Disposal	\$100,000
Subtotal, Contractor	<u>\$220,000</u>
Engineer	\$13,000
Laboratory	\$4,400
Subtotal, Residential Soil/Sediment Excavations	<u><u>\$230,000</u></u>
Former Mill Tailrace Excavation	
Contractor	
Mobilization/Demobilization	\$4,700
Site Preparation	\$20,000
Dredging & Dewatering	\$17,000
Wetlands Restoration	\$25,000
Soil Stabilization	\$1,600
Transportation/Disposal	\$16,000
Subtotal, Contractor	<u>\$85,000</u>
Engineer	\$13,000
Laboratory	\$1,200
Subtotal, Former Mill Tailrace Excavation	<u><u>\$100,000</u></u>
Isolation Cap Installation	
Contractor	
Mobilization/Demobilization	\$4,100
Site Preparation	\$8,100
Isolation Cap Placement	\$260,000
Wetlands Restoration	\$120,000
Subtotal, Contractor	<u>\$390,000</u>
Engineer	\$25,000
Subtotal, Isolation Cap Installation	<u><u>\$410,000</u></u>
Post-Construction Submittals/As-Builts	\$37,000

TABLE D-4c.1
Cost Estimate Summary for
Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos \geq 1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos \geq 1%)
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Walpole, Massachusetts

Subtotal, Construction Activities	\$850,000
Scope Contingency (15% Construction Activities Subtotal)	\$130,000
Bid Contingency (15% Construction Activities Subtotal)	\$130,000
Subtotal, Construction Activities with Contingencies	\$1,100,000
Professional/Technical Services	
Project Management (6% Construction Activities Subtotal w/Contingencies)	\$70,000
Remedial Design (12% Construction Activities Subtotal w/Contingencies)	\$132,000
Construction Management (8% Construction Activities Subtotal w/Contingencies)	\$88,000
Subtotal, Professional/Technical Services	\$290,000
Institutional Controls	
Establish Deed Restrictions	\$35,000
Subtotal, Institutional Controls	\$35,000
TOTAL, CAPITAL COSTS	\$1,400,000
ANNUAL O&M COSTS	
O&M Activities	
Isolation Cap Maintenance	
Contractor	
Mobilization/Demobilization	\$880
Cap Maintenance/Repairs	\$2,500
Subtotal, Contractor	\$3,400
Engineer	\$1,100
Subtotal, Isolation Cap Maintenance	\$4,600
Subtotal, O&M Activities	\$4,600
Scope Contingency (15% Annual O&M Activities Subtotal)	\$690
Bid Contingency (15% Annual O&M Activities Subtotal)	\$690
Subtotal, O&M Activities with Contingencies	\$6,000
Professional/Technical Services	
Project Management (10% O&M Activities Subtotal w/Contingencies)	\$600
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$900
Subtotal, Professional/Technical Services	\$1,500
TOTAL, ANNUAL O&M COSTS	\$7,500

TABLE D-4c.1
Cost Estimate Summary for
Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos \geq 1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos \geq 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PERIODIC COSTS

O&M Activities

Year 1 Only O&M Activities	
Post-Reconstruction Wetlands Monitoring (year 1 only)	\$9,600
Subtotal, Year 1 Only O&M Activities	\$9,600
Scope Contingency (15% Year 1 Only O&M Activities Subtotal)	\$1,400
Bid Contingency (15% Year 1 Only O&M Activities Subtotal)	\$1,400
Subtotal, Year 1 Only O&M Activities with Contingencies	<u>\$12,000</u>
Subtotal, O&M Activities	\$12,000

Professional/Technical Services

Project Management (10% O&M Activities Subtotal w/Contingencies)	\$1,200
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$1,800
Five-Year Review	\$13,000
Subtotal, Professional/Technical Services	<u>\$16,000</u>

TOTAL, PERIODIC COSTS

\$28,000

PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$1,400,000	\$1,400,000	1	\$1,400,000
Annual O&M Costs	1-100	\$750,000	\$7,500	14.3	\$110,000
Periodic Costs	1	\$15,000	\$15,000	0.935	\$14,000
Periodic Costs	5	\$13,000	\$13,000	0.713	\$9,300
Periodic Costs	10	\$13,000	\$13,000	0.508	\$6,600
Periodic Costs	15	\$13,000	\$13,000	0.362	\$4,700
Periodic Costs	20	\$13,000	\$13,000	0.258	\$3,400
Periodic Costs	25	\$13,000	\$13,000	0.184	\$2,400
Periodic Costs	30	\$13,000	\$13,000	0.131	\$1,700
Periodic Costs	35	\$13,000	\$13,000	0.0937	\$1,200
Periodic Costs	40	\$13,000	\$13,000	0.0668	\$870
Periodic Costs	45	\$13,000	\$13,000	0.0476	\$620
Periodic Costs	50	\$13,000	\$13,000	0.0339	\$440
Periodic Costs	55	\$13,000	\$13,000	0.0242	\$310
Periodic Costs	60	\$13,000	\$13,000	0.0173	\$220
Periodic Costs	65	\$13,000	\$13,000	0.0123	\$160
Periodic Costs	70	\$13,000	\$13,000	0.00877	\$110
Periodic Costs	75	\$13,000	\$13,000	0.00625	\$81
Periodic Costs	80	\$13,000	\$13,000	0.00446	\$58
Periodic Costs	85	\$13,000	\$13,000	0.00318	\$41
Periodic Costs	90	\$13,000	\$13,000	0.00227	\$30
Periodic Costs	95	\$13,000	\$13,000	0.00162	\$21
Periodic Costs	100	\$13,000	\$13,000	0.00115	\$15

TOTAL PRESENT VALUE OF ALTERNATIVE

\$1,600,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-4c.2
Detailed Cost Estimate for
Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Subaqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT	COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS						
Construction Activities						
Implementation Plans/Submittals	1		\$74,000	Ea.	\$74,000	SHA estimate
Residential Soil/Sediment Excavations						
Contractor						
Mobilization/Demobilization						
Mob/Demob, Loader, Compactor 70 to 150 HP	4		\$417	Ea.	\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Above 150 HP	2		\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2		\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decontaminate Light Equipment	1		\$199	Ea.	\$199	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4		\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.
Subtotal, Mobilization/Demobilization					\$4,900	\$4,897
Site Preparation						
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	600		\$4.28	L.F.	\$2,568	ECHOS 18 05 0206
Subtotal, Site Preparation					\$2,600	\$2,568
Excavation						
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	40		\$299	Hr.	\$11,960	ECHOS 17 03 0231; Assumes H&S level C.
926, 2.0 CY, Wheel Loader	40		\$204	Hr.	\$8,160	ECHOS 17 03 0222; Assumes H&S level C.
Bobcat	40		\$180	Hr.	\$7,200	ECHOS Crew Code COBBC; Assumes H&S level C.
Water Truck	40		\$103	Hr.	\$4,896	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	21,400		\$0.06	S.F.	\$1,284	ECHOS 33 08 0585; Assumes H&S level C.
Subtotal, Excavation					\$34,000	\$33,500
Backfill						
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	24		\$199	Hr.	\$4,776	ECHOS 17 03 0231
926, 2.0 CY, Wheel Loader	24		\$130	Hr.	\$3,120	ECHOS 17 03 0222
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	24		\$344	Hr.	\$8,256	ECHOS Crew Code COFCQ (Modified)
Unclassified Fill, Delivered, Off-site	424		\$12	C.Y.	\$5,088	ECHOS 02223 1001
Subtotal, Backfill					\$21,000	\$21,240
Site Restoration						
Topsoil, Furnish & Place, 6" Lifts, Off-site	397		\$55	C.Y.	\$21,835	ECHOS 18 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	22		\$27	M.S.F.	\$594	Means 32 92 19.13 0800
Subtotal, Site Restoration					\$22,000	\$22,429
Soil Stabilization						
In-Situ Cement Stabilization, 6%	820		\$34	B.C.Y.	\$27,880	ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization; Assumes H&S level C.
Subtotal, Soil Stabilization					\$28,000	\$27,880
Transportation/Disposal						
Asbestos-Impacted Soils, Non-Hazardous	1,304		\$80	Ton	\$104,320	SHA discussions with Waste Management, Inc.; Includes excavated material plus stabilizing additive at 6%.
Subtotal, Transportation & Disposal					\$100,000	\$104,320
Subtotal, Contractor					\$220,000	\$216,834

TABLE D-4c.2
Detailed Cost Estimate for
Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos ≥ 1%)
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Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Subaqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor	110	\$99	Hr.	\$10,890	Assumes 2 weeks of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$1,634	L.S.	\$1,634	Assumes 15% of labor cost
Subtotal, Engineer				\$13,000	\$12,524
Laboratory					
Chemical analysis, Soil Management Assessment Package I	4	\$965	Ea.	\$3,860	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Lead Confirmatory	5	\$13	Ea.	\$65	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	10	\$50	Ea.	\$500	SHA discussions with EMSL Analytical, Inc.
Subtotal, Laboratory				\$4,400	\$4,425
Subtotal, Residential Soil/Sediment Excavations				\$230,000	\$233,783
Former Mill Tailrace Excavation					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Clamshell, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Mob/Demob, Fractionation Tank	2	\$305	Ea.	\$610	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes frac tank; Assumes H&S level D.
Subtotal, Mobilization/Demobilization				\$4,700	\$4,674
Site Preparation					
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	150	\$4.28	L.F.	\$642	ECHOS 18 05 0206
Turbidity Curtains including Deployment	100	\$190	L.F.	\$19,000	SHA discussions with Gunderboom, Inc.
Subtotal, Site Preparation				\$20,000	\$19,642
Dredging & Dewatering					
1.5 CY Clamshell, with 60' Boom	16	\$642	Hr.	\$10,272	ECHOS 17 03 0252; Assumes H&S level C.
926, 2.0 CY, Wheel Loader	16	\$204	Hr.	\$3,264	ECHOS 17 03 0222; Assumes H&S level C.
Bobcat	16	\$180	Hr.	\$2,880	ECHOS Crew Code COBBC; Assumes H&S level C.
10,000 gal Fractionation Tank (coated interior)	2	\$87	Week	\$174	Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings	2	\$125	Week	\$250	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet	2	\$84	Week	\$168	Rain for Rent, Inc. Quote dated 09/24/07
Subtotal, Dredging & Dewatering				\$17,000	\$17,008

TABLE D-4c.2
Detailed Cost Estimate for
Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos ≥ 1%)
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SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Subaqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Wetlands Restoration					
(Includes restoration of additional 400 S.F. due to construction disturbance)					
1.5 CY Clamshell, with 60' Boom	16	\$435	Hr.	\$6,960	ECHOS 17 03 0252
926, 2.0 CY, Wheel Loader	16	\$130	Hr.	\$2,080	ECHOS 17 03 0222
Bobcat	16	\$112	Hr.	\$1,792	ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	33	\$55	C.Y.	\$1,815	ECHOS 18 05 0301
Screened Leaf Compost, Delivered	25	\$17	C.Y.	\$425	SHA discussions with Agresource, Inc.
Trees, 2-3' CG - 15' on center, 5/M.S.F.	2	\$50	Ea.	\$100	SHA discussions with Normandeau Associates, Inc.
Shrubs, 18-24" CG - 8' on center, 15/M.S.F.	6	\$20	Ea.	\$120	SHA discussions with Normandeau Associates, Inc.
Fertilizer Tablets, 1/plant, 250 count per box	1	\$30	Ea.	\$30	SHA discussions with Normandeau Associates, Inc.
Wetland Seed Mix	2	\$75	Pounds	\$150	SHA discussions with Normandeau Associates, Inc.
Conservation Seed Mix	1	\$50	Pounds	\$50	SHA discussions with Normandeau Associates, Inc.
Annual Rye Grass	1	\$1.00	Pounds	\$1	SHA discussions with Normandeau Associates, Inc.
Aquatic Plants, 2' on center, wetland, 250/M.S.F.	275	\$5.00	Ea.	\$1,375	SHA discussions with Normandeau Associates, Inc.
Planting/Seeding Labor	8	\$66	Hr.	\$528	SHA discussions with Normandeau Associates, Inc.; ECHOS Crew Code ULABA
Wetlands Specialist, Construction Oversight	40	\$100	Hr.	\$4,000	SHA discussions with Normandeau Associates, Inc.; Assumes upto 5 site visits during and immediately following construction/restoration activities.
Surveying, 2-person Crew	2	\$2,950	Day	\$5,899	ECHOS 99 04 1201; Assumes H&S level C.
Subtotal, Wetlands Restoration				\$25,000	\$25,325
Soil Stabilization					
Cement Stabilization, 6%	50	\$32	B.C.Y.	\$1,600	ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization; Assumes H&S level C.
Subtotal, Soil Stabilization				\$1,600	\$1,600
Transportation/Disposal					
Asbestos-Impacted Soils, Non-Hazardous	93	\$125	Ton	\$11,625	SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due to
Water, Asbestos-Impacted, Non-Hazardous	5,000	\$0.95	Gal.	\$4,750	SHA discussions with N.E. Environmental Solutions, Inc.; Assumes no pre-treatment of water.
Subtotal, Transportation & Disposal				\$16,000	\$16,375
Subtotal, Contractor				\$85,000	\$84,624
Engineer					
Labor	110	\$99	hr	\$10,890	Assumes 10 days of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$1,634	l.s.	\$1,634	Assumes 15% of labor cost
Subtotal, Engineer				\$13,000	\$12,524
Laboratory					
Chemical analysis, Soil Management Assessment Package I	1	\$965	Ea.	\$965	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	5	\$50	Ea.	\$250	SHA discussions with EMSL Analytical, Inc.
Subtotal, Laboratory				\$1,200	\$1,215
Subtotal, Former Mill Tailrace Excavation				\$100,000	\$98,363

TABLE D-4c.2
Detailed Cost Estimate for
Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
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SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Subaqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Isolation Cap Installation					
<i>Contractor</i>					
Mobilization/Demobilization					
Mob/Demob, Loader 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801
Decontaminate Medium Equipment	3	\$399	Ea.	\$1,197	ECHOS 33 17 0802
Crew, 100 miles, per person	3	\$192	Ea.	\$576	ECHOS 33 01 0204
Subtotal, Mobilization/Demobilization				\$4,100	\$4,137
Site Preparation					
Clearing, Medium Brush with Average Grub & Some Trees	1.1	\$1,254	Acre	\$1,336	ECHOS 17 01 0103
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	16	\$299	Hr.	\$4,784	ECHOS 17 03 0231
Bobcat	16	\$126	Hr.	\$2,016	ECHOS Crew Code COBBC
Subtotal, Site Preparation				\$8,100	\$8,136
Isolation Cap Placement					
Geotextile cover & fabric-formed grout filled revetment mat placement	46,400	\$5.50	S.F.	\$255,200	J.F. Brennan Co., Inc. Cost Estimate dated August 2007.
Subtotal, Isolation Cap Placement				\$260,000	\$255,200
Wetlands Restoration					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	36	\$299	Hr.	\$10,764	ECHOS 17 03 0231
926, 2.0 CY, Wheel Loader	36	\$130	Hr.	\$4,680	ECHOS 17 03 0222
Bobcat	36	\$126	Hr.	\$4,536	ECHOS Crew Code COBBC
Coir Biolog plus butterfly anchors, 1' x 10' log	87	\$100	Log	\$8,700	SHA discussions with Normandeau Associates, Inc.
Topsoil, Furnish & Place, 6" Lifts, Off-site	566	\$55	C.Y.	\$31,130	ECHOS 18 05 0301
Screened Leaf Compost, Delivered	487	\$17	C.Y.	\$8,279	SHA discussions with Agresource, Inc.
Sand/Gravel Fill for Streambed	294	\$23	C.Y.	\$6,762	ECHOS 17 03 0430
Trees, 2-3' CG - 15' on center, 5/M.S.F.	150	\$50	Ea.	\$7,500	SHA discussions with Normandeau Associates, Inc.
Shrubs, 18-24" CG - 8' on center, 15/M.S.F.	450	\$20	Ea.	\$9,000	SHA discussions with Normandeau Associates, Inc.
Fertilizer Tablets, 1/plant, 250 count per box	3	\$30	Ea.	\$90	SHA discussions with Normandeau Associates, Inc.
Wetland Seed Mix	37	\$75	Pounds	\$2,775	SHA discussions with Normandeau Associates, Inc.
Conservation Seed Mix	6	\$50	Pounds	\$300	SHA discussions with Normandeau Associates, Inc.
Annual Rye Grass	28	\$1.00	Pounds	\$28	SHA discussions with Normandeau Associates, Inc.
Aquatic Plants, 2' on center, wetland, 250/M.S.F.	200	\$5.00	Ea.	\$1,000	SHA discussions with Normandeau Associates, Inc.
Planting/Seeding Labor	48	\$66	Hr.	\$3,168	SHA discussions with Normandeau Associates, Inc.; ECHOS Crew Code ULABA
Wetlands Specialist, Construction Oversight	96	\$100	Hr.	\$9,600	SHA discussions with Normandeau Associates, Inc.; Assumes up to 8 site visits during and immediately following construction/restoration activities.
Surveying, 2-person Crew	5	\$2,023	Day	\$10,114	ECHOS 99 04 1201
Subtotal, Wetlands Restoration				\$120,000	\$118,426
Subtotal, Contractor				\$390,000	\$385,899
<i>Engineer</i>					
Labor					
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$3,267	L.S.	\$3,267	Assumes 15% of labor cost
Subtotal, Engineer				\$25,000	\$25,047
Subtotal, Isolation Cap Installation				\$410,000	\$410,946

TABLE D-4c.2
Detailed Cost Estimate for
Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Post-Construction Submittals/As-Built	1	\$37,000	Ea.	\$37,000	SHA estimate
Subtotal, Construction Activities				\$850,000	
<i>Scope Contingency (15% Construction Activities Subtotal)</i>				\$130,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
<i>Bid Contingency (15% Construction Activities Subtotal)</i>				\$130,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities with Contingencies				\$1,100,000	
Professional/Technical Services					
<i>Project Management (6% Construction Activities Subtotal w/Contingencies)</i>				\$70,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
<i>Remedial Design (12% Construction Activities Subtotal w/Contingencies)</i>				\$132,000	OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies
<i>Construction Management (8% Construction Activities Subtotal w/Contingencies)</i>				\$88,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$290,000	
Institutional Controls					
Establish Deed Restrictions					
<i>Engineer</i>					
Establish Institutional Controls in the form of Deed Restrictions	7	\$5,000	Ea.	\$35,000	Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				\$35,000	\$35,000
Subtotal, Establish Deed Restrictions				\$35,000	\$35,000
Subtotal, Institutional Controls				\$35,000	
TOTAL, CAPITAL COSTS				\$1,400,000	

ANNUAL O&M COSTS

O&M Activities

Isolation Cap Maintenance

Contractor

Mobilization/Demobilization					
Crew, 100 miles, per person	3	\$192	Ea.	\$576	ECHOS 33 01 0204
Mob/Demob, Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801
Subtotal, Mobilization/Demobilization				\$880	\$880
Cap Maintenance/Repairs					
Bobcat	8	\$126	Hr.	\$1,008	ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	10	\$55	C.Y.	\$550	ECHOS 18 05 0301
Screened Leaf Compost, Delivered	10	\$17	C.Y.	\$170	SHA discussions with Agresource, Inc.
Fertilizer Tablets, 1/plant, 250 count per box	3	\$30	Ea.	\$90	SHA discussions with Normandeau Associates, Inc.
Wetland Seed Mix	2	\$75	Pounds	\$150	SHA discussions with Normandeau Associates, Inc.
Conservation Seed Mix	1	\$50	Pounds	\$50	SHA discussions with Normandeau Associates, Inc.
Annual Rye Grass	2	\$1.00	Pounds	\$2	SHA discussions with Normandeau Associates, Inc.
Planting/Seeding Labor	8	\$66	Hr.	\$528	SHA discussions with Normandeau Associates, Inc.;
Subtotal, Cap Maintenance/Repairs				\$2,500	\$2,548
Subtotal, Contractor				\$3,400	\$3,428

TABLE D-4c.2
Detailed Cost Estimate for
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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor	10	\$99	Hr.	\$990	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$149	L.S.	\$149	Assumes 15% of labor cost
Subtotal, Engineer				\$1,100	\$1,139
Subtotal, Isolation Cap Maintenance				\$4,600	\$4,567
Subtotal, O&M Activities				\$4,600	
<i>Scope Contingency (15% Annual O&M Activities Subtotal)</i>				\$690	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
<i>Bid Contingency (15% Annual O&M Activities Subtotal)</i>				\$690	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
Subtotal, O&M Activities with Contingencies				\$6,000	
Professional/Technical Services					
<i>Project Management (10% O&M Activities Subtotal w/Contingencies)</i>				\$600	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
<i>Technical Support (15% O&M Activities Subtotal w/Contingencies)</i>				\$900	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$1,500	
TOTAL, ANNUAL O&M COSTS				\$7,500	

PERIODIC COSTS

O&M Activities

Year 1 Only O&M Activities

Post-Reconstruction Wetlands Monitoring (year 1 only)

Contractor

Post-Construction Wetlands Monitoring	1	\$9,600	L.S.	\$9,600	SHA discussions with Normandeau Associates, Inc.; Assumes up to 3 post-reconstruction site visits to occur during the following two growing seasons and summary report preparation.
Subtotal, Contractor				\$9,600	\$9,600
Subtotal, Post-Reconstruction Wetlands Monitoring (year 1 only)				\$9,600	\$9,600
Subtotal, Year 1 Only O&M Activities				\$9,600	
<i>Scope Contingency (15% Year 1 Only O&M Activities Subtotal)</i>				\$1,400	OSWER 5-6: Assume 15% of Periodic O&M Activities Subtotal
<i>Bid Contingency (15% Year 1 Only O&M Activities Subtotal)</i>				\$1,400	OSWER 5-6: Assume 15% of Periodic O&M Activities Subtotal
Subtotal, Year 1 Only O&M Activities with Contingencies				\$12,000	
Subtotal, O&M Activities				\$12,000	

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(Asbestos ≥ 1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Subaqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
<i>Project Management (10% O&M Activities Subtotal w/Contingencies)</i>				\$1,200	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
<i>Technical Support (15% O&M Activities Subtotal w/Contingencies)</i>				\$1,800	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Five-Year Review					
<i>Engineer</i>					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
Subtotal, Engineer				\$13,000	<i>\$13,020</i>
Subtotal, Five-Year Review				\$13,000	<i>\$13,020</i>
Subtotal, Professional/Technical Services				\$16,000	
TOTAL, PERIODIC COSTS				\$28,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sum S.F. = square feet
C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- The following assumptions were used for the former mill tailrace quantity estimates:
 - We assumed "swell" factor of 18% for excavated soils, when estimating L.C.Y. volume.
 - We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
 - We assumed 1 cubic yard of dredged and dewatered sediments weighs approximately 1.75 tons.
- "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

Appendix D-4d

Cost Estimates for Alternative SSW-5

TABLE D-4d.1
Cost Estimate Summary for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos \geq 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos \geq 1%)
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CAPITAL COSTS

Construction Activities

Implementation Plans/Submittals	\$100,000
 Residential Soil/Sediment Excavations	
Contractor	
Mobilization/Demobilization	\$4,900
Site Preparation	\$2,600
Excavation	\$34,000
Backfill	\$21,000
Site Restoration	\$22,000
Soil Stabilization	\$28,000
Transportation/Disposal	\$100,000
Subtotal, Contractor	\$220,000
 Engineer	\$13,000
Laboratory	\$4,400
Subtotal, Residential Soil/Sediment Excavations	\$230,000
 Former Mill Tailrace Excavation	
Contractor	
Mobilization/Demobilization	\$4,700
Site Preparation	\$20,000
Dredging & Dewatering	\$17,000
Wetlands Restoration	\$25,000
Soil Stabilization	\$1,600
Transportation/Disposal	\$16,000
Subtotal, Contractor	\$85,000
 Engineer	\$13,000
Laboratory	\$1,200
Subtotal, Former Mill Tailrace Excavation	\$100,000
 Lewis Pond Dredging	
Contractor	
Mobilization/Demobilization	\$14,000
Site Preparation	\$18,000
Dredging & Dewatering	\$290,000
Site Restoration (Temporary Access Road Removal/Restoration)	\$14,000
Wetlands Restoration	\$130,000
Soil Stabilization	\$120,000
Transportation/Disposal	\$920,000
Subtotal, Contractor	\$1,500,000

TABLE D-4d.1
Cost Estimate Summary for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos \geq 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos \geq 1%)
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Engineer	\$38,000
Laboratory	\$15,000
Subtotal, Lewis Pond Dredging	<u>\$1,500,000</u>
Post-Construction Submittals/As-Built	\$50,000
Subtotal, Construction Activities	\$2,000,000
Scope Contingency (15% Construction Activities Subtotal)	\$300,000
Bid Contingency (15% Construction Activities Subtotal)	\$300,000
Subtotal, Construction Activities with Contingencies	<u>\$2,600,000</u>
Professional/Technical Services	
Project Management (5% Construction Activities Subtotal w/Contingencies)	\$130,000
Remedial Design (8% Construction Activities Subtotal w/Contingencies)	\$210,000
Construction Management (6% Construction Activities Subtotal w/Contingencies)	\$160,000
Subtotal, Professional/Technical Services	<u>\$500,000</u>
TOTAL, CAPITAL COSTS	<u><u>\$3,100,000</u></u>
PERIODIC COSTS	
O&M Activities	
Year 1 Only O&M Activities	
Post-Reconstruction Wetlands Monitoring (year 1 only)	\$9,600
Subtotal, Year 1 Only O&M Activities	\$9,600
Scope Contingency (15% Year 1 Only O&M Activities Subtotal)	\$1,400
Bid Contingency (15% Year 1 Only O&M Activities Subtotal)	\$1,400
Subtotal, Year 1 Only O&M Activities with Contingencies	<u>\$12,000</u>
Subtotal, O&M Activities	\$12,000
Professional/Technical Services	
Project Management (10% O&M Activities Subtotal w/Contingencies)	\$1,200
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$1,800
Subtotal, Professional/Technical Services	\$3,000
TOTAL, PERIODIC COSTS	<u><u>\$15,000</u></u>

TABLE D-4d.1
Cost Estimate Summary for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos \geq 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos \geq 1%)
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PRESENT VALUE ANALYSIS

<u>Type of Cost</u>	<u>Year</u>	<u>Total Cost</u>	<u>Total Cost Per Year</u>	<u>Discount Factor</u>	<u>Present Value</u>
Capital Costs	0	\$3,100,000	\$3,100,000	1	\$3,100,000
Periodic Costs	1	\$15,000	\$15,000	0.935	\$14,000

TOTAL PRESENT VALUE OF ALTERNATIVE

\$3,100,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-4d.2
Detailed Cost Estimate for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
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SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT	COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS						
Construction Activities						
Implementation Plans/Submittals	1		\$100,000	Ea.	\$100,000	SHA estimate
Residential Soil/Sediment Excavations						
Contractor						
Mobilization/Demobilization						
Mob/Demob, Loader, Compactor 70 to 150 HP	4		\$417	Ea.	\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Above 150 HP	2		\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2		\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decontaminate Light Equipment	1		\$199	Ea.	\$199	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4		\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.
Subtotal, Mobilization/Demobilization					\$4,900	\$4,897
Site Preparation						
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	600		\$4.28	L.F.	\$2,568	ECHOS 18 05 0206
Subtotal, Site Preparation					\$2,600	\$2,568
Excavation						
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	40		\$299	Hr.	\$11,960	ECHOS 17 03 0231; Assumes H&S level C.
926, 2.0 CY, Wheel Loader	40		\$204	Hr.	\$8,160	ECHOS 17 03 0222; Assumes H&S level C.
Bobcat	40		\$180	Hr.	\$7,200	ECHOS Crew Code COBBC; Assumes H&S level C.
Water Truck	40		\$103	Hr.	\$4,896	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	21,400		\$0.06	S.F.	\$1,284	ECHOS 33 08 0585; Assumes H&S level C.
Subtotal, Excavation					\$34,000	\$33,500
Backfill						
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	24		\$199	Hr.	\$4,776	ECHOS 17 03 0231
926, 2.0 CY, Wheel Loader	24		\$130	Hr.	\$3,120	ECHOS 17 03 0222
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	24		\$344	Hr.	\$8,256	ECHOS Crew Code COFCQ (Modified)
Unclassified Fill, Delivered, Off-site	424		\$12	C.Y.	\$5,088	ECHOS 02223 1001
Subtotal, Backfill					\$21,000	\$21,240
Site Restoration						
Topsoil, Furnish & Place, 6" Lifts, Off-site	397		\$55	C.Y.	\$21,835	ECHOS 18 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	22		\$27	M.S.F.	\$594	Means 32 92 19.13 0800
Subtotal, Site Restoration					\$22,000	\$22,429
Soil Stabilization						
In-Situ Cement Stabilization, 6%	820		\$34	B.C.Y.	\$27,880	ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization; Assumes H&S level C.
Subtotal, Soil Stabilization					\$28,000	\$27,880
Transportation/Disposal						
Asbestos-Impacted Soils, Non-Hazardous	1,304		\$80	Ton	\$104,320	SHA discussions with Waste Management, Inc.; Includes excavated material plus stabilizing additive at 6%.
Subtotal, Transportation & Disposal					\$100,000	\$104,320
Subtotal, Contractor					\$220,000	\$216,834

TABLE D-4d.2
Detailed Cost Estimate for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
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Walpole, Massachusetts

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SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor	110	\$99	Hr.	\$10,890	Assumes 2 weeks of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$1,634	L.S.	\$1,634	Assumes 15% of labor cost
Subtotal, Engineer				\$13,000	\$12,524
Laboratory					
Chemical analysis, Soil Management Assessment Package I	4	\$965	Ea.	\$3,860	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Lead Confirmatory	5	\$13	Ea.	\$65	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	10	\$50	Ea.	\$500	SHA discussions with EMSL Analytical, Inc.
Subtotal, Laboratory				\$4,400	\$4,425
Subtotal, Residential Soil/Sediment Excavations				\$230,000	\$233,783
Former Mill Tailrace Excavation					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Clamshell, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Mob/Demob, Fractionation Tank	2	\$305	Ea.	\$610	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes frac tank; Assumes H&S level D.
Subtotal, Mobilization/Demobilization				\$4,700	\$4,674
Site Preparation					
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	150	\$4.28	L.F.	\$642	ECHOS 18 05 0206
Turbidity Curtains including Deployment	100	\$190	L.F.	\$19,000	SHA discussions with Gunderboom, Inc.
Subtotal, Site Preparation				\$20,000	\$19,642
Dredging & Dewatering					
1.5 CY Clamshell, with 60' Boom	16	\$642	Hr.	\$10,272	ECHOS 17 03 0252; Assumes H&S level C.
926, 2.0 CY, Wheel Loader	16	\$204	Hr.	\$3,264	ECHOS 17 03 0222; Assumes H&S level C.
Bobcat	16	\$180	Hr.	\$2,880	ECHOS Crew Code COBBC; Assumes H&S level C.
10,000 gal Fractionation Tank (coated interior)	2	\$87	Week	\$174	Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings	2	\$125	Week	\$250	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet	2	\$84	Week	\$168	Rain for Rent, Inc. Quote dated 09/24/07
Subtotal, Dredging & Dewatering				\$17,000	\$17,008

TABLE D-4d.2
Detailed Cost Estimate for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
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SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Wetlands Restoration					
1.5 CY Clamshell, with 60' Boom	16	\$435	Hr.	\$6,960	ECHOS 17 03 0252
926, 2.0 CY, Wheel Loader	16	\$130	Hr.	\$2,080	ECHOS 17 03 0222
Bobcat	16	\$112	Hr.	\$1,792	ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	33	\$55	C.Y.	\$1,815	ECHOS 18 05 0301
Screened Leaf Compost, Delivered	25	\$17	C.Y.	\$425	SHA discussions with Agresource, Inc.
Trees, 2-3' CG - 15' on center, 5/M.S.F.	2	\$50	Ea.	\$100	SHA discussions with Normandeau Associates, Inc.
Shrubs, 18-24" CG - 8' on center, 15/M.S.F.	6	\$20	Ea.	\$120	SHA discussions with Normandeau Associates, Inc.
Fertilizer Tablets, 1/plant, 250 count per box	1	\$30	Ea.	\$30	SHA discussions with Normandeau Associates, Inc.
Wetland Seed Mix	2	\$75	Pounds	\$150	SHA discussions with Normandeau Associates, Inc.
Conservation Seed Mix	1	\$50	Pounds	\$50	SHA discussions with Normandeau Associates, Inc.
Annual Rye Grass	1	\$1.00	Pounds	\$1	SHA discussions with Normandeau Associates, Inc.
Aquatic Plants, 2' on center, wetland, 250/M.S.F.	275	\$5.00	Ea.	\$1,375	SHA discussions with Normandeau Associates, Inc.
Planting/Seeding Labor	8	\$66	Hr.	\$528	SHA discussions with Normandeau Associates, Inc.; ECHOS Crew Code ULABA
Wetlands Specialist, Construction Oversight	40	\$100	Hr.	\$4,000	SHA discussions with Normandeau Associates, Inc.; Assumes upto 5 site visits during and immediately following construction/restoration activities.
Surveying, 2-person Crew	2	\$2,950	Day	\$5,899	ECHOS 99 04 1201; Assumes H&S level C.
Subtotal, Wetlands Restoration				\$25,000	\$25,325
Soil Stabilization					
Cement Stabilization, 6%	50	\$32	B.C.Y.	\$1,600	ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization; Assumes H&S level C.
Subtotal, Soil Stabilization				\$1,600	\$1,600
Transportation/Disposal					
Asbestos-Impacted Soils, Non-Hazardous	93	\$125	Ton	\$11,625	SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due to dewatering activities; Includes dewatered dredged material plus stabilizing additive at 6%.
Water, Asbestos-Impacted, Non-Hazardous	5,000	\$0.95	Gal.	\$4,750	SHA discussions with N.E. Environmental Solutions, Inc.; Assumes no pre-treatment of water.
Subtotal, Transportation & Disposal				\$16,000	\$16,375
Subtotal, Contractor				\$85,000	\$84,624
Engineer					
Labor	110	\$99	hr	\$10,890	Assumes 10 days of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$1,634	l.s.	\$1,634	Assumes 15% of labor cost
Subtotal, Engineer				\$13,000	\$12,524
Laboratory					
Chemical analysis, Soil Management Assessment Package I	1	\$965	Ea.	\$965	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	5	\$50	Ea.	\$250	SHA discussions with EMSL Analytical, Inc.
Subtotal, Laboratory				\$1,200	\$1,215
Subtotal, Former Mill Tailrace Excavation				\$100,000	\$98,363

TABLE D-4d.2
Detailed Cost Estimate for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
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SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Lewis Pond Dredging					
<i>Contractor</i>					
Mobilization/Demobilization					
Mob/Demob, Loader, Compactor, 70 to 150 HP	4	\$417	Ea.	\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Mob/Demob, Fractionation Tank	18	\$305	Ea.	\$5,490	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801
Decontaminate Medium Equipment	12	\$399	Ea.	\$4,788	ECHOS 33 17 0802; Includes frac tanks
Crew, 100 miles, per person	5	\$192	Ea.	\$960	ECHOS 33 01 0204
Subtotal, Mobilization/Demobilization				\$14,000	\$14,436
Site Preparation					
Clearing, Medium Brush with Average Grub & Some Trees	0.3	\$1,254	Acre	\$376	ECHOS 17 01 0103; Assumes 9,670 S.F. will be cleared at same level of effort as 0.3 acre.
Temporary Roads, gravel fill, no surfacing, 8" gravel depth	1,075	\$16	S.Y.	\$17,200	Means 01 55 23.50 0100
Subtotal, Site Preparation				\$18,000	\$17,576
Dredging & Dewatering					
Mechanical Dredging, 2 CY Hydraulic Excavator with RTK GPS, 950 3.0 CY, Wheel Loader, Bobcat, & Small Equipment	1	\$270,000	L.S.	\$270,000	J.F. Brennan Co., Inc. Cost Estimate dated July 2007; Includes erosion and sediment controls
21,000 gal Fractionation Tanks (coated interior); 2-Month Rental	9	\$648	Ea.	\$5,832	Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings; 2-Month Rental	2	\$750	Ea.	\$1,500	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet; 2-Month Rental	2	\$504	Ea.	\$1,008	Rain for Rent, Inc. Quote dated 09/24/07
Filtration system, 4-stage tandem unit, 200 gpm	2	\$2,800	Month	\$5,600	SHA discussions with N.E. Environmental Solutions, Inc.
Filtration system hoses	2	\$400	Month	\$800	SHA discussions with N.E. Environmental Solutions, Inc.
Filtration system pumps, 2" submersibles	2	\$800	Month	\$1,600	SHA discussions with N.E. Environmental Solutions, Inc.
Filters	240	\$8.00	Ea.	\$1,920	SHA discussions with N.E. Environmental Solutions, Inc.
Subtotal, Excavation				\$290,000	\$288,260
Site Restoration (Temporary Access Road Removal/Restoration)					
Crawler-mounted, 2.0 C.Y. 225 Hydraulic Excavator	8	\$282	Hr.	\$2,256	ECHOS 17 03 0232
926, 2.0 CY, Wheel Loader	8	\$130	Hr.	\$1,040	ECHOS 17 03 0222
Bobcat	8	\$112	Hr.	\$896	ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	180	\$55	C.Y.	\$9,900	ECHOS 18 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	10	\$27	M.S.F.	\$270	Means 32 92 19.13 0800
Subtotal, Site Restoration				\$14,000	\$14,362

TABLE D-4d.2
Detailed Cost Estimate for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
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SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Wetlands Restoration					
Crawler-mounted, 2.0 C.Y. 225 Hydraulic Excavator	36	\$282	Hr.	\$10,152	ECHOS 17 03 0232
950, 3.0 CY, Wheel Loader	36	\$135	Hr.	\$4,860	ECHOS 17 03 0223
Bobcat	36	\$112	Hr.	\$4,032	ECHOS Crew Code COBBC
Unclassified Fill, Delivered, Off-site	2,174	\$12	C.Y.	\$26,088	ECHOS 02223 1001
Topsoil, Furnish & Place, 6" Lifts, Off-site	566	\$55	C.Y.	\$31,130	ECHOS 18 05 0301
Screened Leaf Compost, Delivered	566	\$17	C.Y.	\$9,622	SHA discussions with Agresource, Inc.
Sand/Gravel Fill for Streambed	294	\$23	C.Y.	\$6,762	ECHOS 17 03 0430
Trees, 2-3' CG - 15' on center, 5/M.S.F.	22	\$50	Ea.	\$1,100	SHA discussions with Normandeau Associates, Inc.
Shrubs, 18-24" CG - 8' on center, 15/M.S.F.	64	\$20	Ea.	\$1,280	SHA discussions with Normandeau Associates, Inc.
Fertilizer Tablets, 1/plant, 250 count per box	1	\$30	Ea.	\$30	SHA discussions with Normandeau Associates, Inc.
Wetland Seed Mix	41	\$75	Pounds	\$3,075	SHA discussions with Normandeau Associates, Inc.
Annual Rye Grass	28	\$1.00	Pounds	\$28	SHA discussions with Normandeau Associates, Inc.
Aquatic Plants, 2' on center, wetland, 250/M.S.F.	3,390	\$5.00	Ea.	\$16,950	SHA discussions with Normandeau Associates, Inc.
Planting/Seeding Labor	48	\$66	Hr.	\$3,168	SHA discussions with Normandeau Associates, Inc.; ECHOS Crew Code ULABA
Wetlands Specialist, Construction Oversight	96	\$100	Hr.	\$9,600	SHA discussions with Normandeau Associates, Inc.; Assumes up to 12 site visits during and immediately following construction/restoration activities.
Surveying, 2-person Crew	5	\$2,023	Day	\$10,114	ECHOS 99 04 1201
Subtotal, Wetlands Restoration				\$130,000	\$127,839
Soil Stabilization					
Cement Stabilization, 6%	3,600	\$32	B.C.Y.	\$115,200	ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization.
Subtotal, Soil Stabilization				\$120,000	\$115,200
Transportation/Disposal					
Asbestos-Impacted Soils, Non-Hazardous	6,678	\$125	Ton	\$834,750	SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due to dewatering activities; Includes dewatered dredged material plus stabilizing additive at 6%.
Water, Asbestos-Impacted, Non-Hazardous	361,000	\$0.20	Gal.	\$72,200	SHA discussions with N.E. Environmental Solutions, Inc.
Temporary Road Fill Material	358	\$25	Ton	\$8,954	SHA discussions with Waste Management, Inc.
Subtotal, Transportation & Disposal				\$920,000	\$915,904
Subtotal, Contractor				\$1,500,000	\$1,479,215
Engineer					
Labor	330	\$99	hr	\$32,670	Assumes 6 weeks of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$4,901	l.s.	\$4,901	Assumes 15% of labor cost
Subtotal, Engineer				\$38,000	\$37,571
Laboratory					
Chemical analysis, Soil Management Assessment Package I	13	\$965	Ea.	\$12,545	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	50	\$50	Ea.	\$2,500	SHA discussions with EMSL Analytical, Inc.
Subtotal, Laboratory				\$15,000	\$15,045
Subtotal, Lewis Pond Dredging				\$1,500,000	\$1,531,831
Post-Construction Submittals/As-Builts	1	\$50,000	Ea.	\$50,000	SHA estimate
Subtotal, Construction Activities				\$2,000,000	
Scope Contingency (15% Construction Activities Subtotal)				\$300,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Bid Contingency (15% Construction Activities Subtotal)				\$300,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities with Contingencies				\$2,600,000	

TABLE D-4d.2
Detailed Cost Estimate for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
<i>Project Management (5% Construction Activities Subtotal w/Contingencies)</i>				\$130,000	OSWER 5-8: Assume 5% of Construction Activities Subtotal including contingencies
<i>Remedial Design (8% Construction Activities Subtotal w/Contingencies)</i>				\$210,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
<i>Construction Management (6% Construction Activities Subtotal w/Contingencies)</i>				\$160,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$500,000	

TOTAL, CAPITAL COSTS **\$3,100,000**

PERIODIC COSTS

O&M Activities

Year 1 Only O&M Activities

Post-Reconstruction Wetlands Monitoring (year 1 only)

Contractor

Post-Construction Wetlands Monitoring	1	\$9,600	L.S.	\$9,600	SHA discussions with Normandeau Associates, Inc.; Assumes up to 3 post-reconstruction site visits to occur during the following two growing seasons and summary report preparation.
Subtotal, Contractor				\$9,600	\$9,600

Subtotal, Post-Reconstruction Wetlands Monitoring (year 1 only) **\$9,600** **\$9,600**

Subtotal, Year 1 Only O&M Activities **\$9,600**

<i>Scope Contingency (15% Year 1 Only O&M Activities Subtotal)</i>				\$1,400	OSWER 5-6: Assume 15% of Periodic O&M Activities Subtotal
<i>Bid Contingency (15% Year 1 Only O&M Activities Subtotal)</i>				\$1,400	OSWER 5-6: Assume 15% of Periodic O&M Activities Subtotal
Subtotal, Year 1 Only O&M Activities with Contingencies				\$12,000	

Subtotal, O&M Activities **\$12,000**

TABLE D-4d.2
Detailed Cost Estimate for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
(Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Revision No.: 01 - DRAFT
Date: October 2007

SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
<i>Project Management (10% O&M Activities Subtotal w/Contingencies)</i>				\$1,200	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
<i>Technical Support (15% O&M Activities Subtotal w/Contingencies)</i>				\$1,800	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				\$3,000	
TOTAL, PERIODIC COSTS				\$15,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sump S.F. = square feet
C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard
Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

- "Means" refers to one of the following:
RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
- "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
- Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- The following assumptions were used for the former mill tailrace quantity estimates:
 - We assumed "swell" factor of 18% for excavated soils, when estimating L.C.Y. volume.
 - We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
 - We assumed 1 cubic yard of dredged and dewatered sediments weighs approximately 1.75 tons.
- "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- All subtotals and total are rounded to 2 significant numbers. The number presented *initials* to the right of rounded subtotals is the unrounded summed value.